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The Canadian Entomologist

VOLUME XXX.

SPHINX EREMITUS.

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The Canadian Entomologist.

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JAMES FLETCHER, LL. D., F. R. S. C., F. L. S.

We are happy to be able to begin the thirtieth volume of the CANADIAN ENTOMOLOGIST by presenting to our readers an excellent portrait of DR. JAMES FLETCHER, whose name is a household word among entomologists, not only in Canada, but throughout North America, and in many parts of the world besides. Born and educated in England, Dr. Fletcher came to this country, when a young man, as a junior officer in the Bank of British North America, and soon began to devote his leisure hours to the study of insects and plants. Finding the work of a bank by no means congenial to his literary and scientific tastes, he obtained a position as assistant in the Library of Parliament at Ottawa. It was not long before his talents and attainments in botany and entomology became widely known, chiefly through his contributions to this magazine and the annual reports of our Society. His first paper in the latter was an article on Canadian Buprestidæ, which was published in 1878, while his first contribution to this magazine appeared in January, 1880. During all the years that have followed no volume of either publication has been issued without some valuable articles from his pen.

In 1878 he became a member of the Council of the Entomological Society of Ontario, and every year since has been elected to hold some office in the Society, being four times vice-president, and for three years, 1886–8, president. In 1879 he was one of the originators of the Ottawa Field Naturalists' Club, the most successful society of the kind in the Dominion, and more recently he suggested, and by his influence and energy accomplished, the formation of the important Association of Economic Entomologists of North America.

The first official recognition of his attainments was in 1885, when he was appointed Honorary Entomologist to the Department of Agriculture at Ottawa, and in that capacity, though much hampered by his duties in the library, he published a valuable report on the injurious insects of the year. Two years later his present position of Entomologist and Botanist to the Experimental Farms of the Dominion was conferred upon him. In

the ten years that have now gone by, he has done an enormous amount of valuable work, as shown in his annual reports and evidence before the Standing Committee of the House of Commons on Agriculture, his voluminous correspondence with farmers and fruit-growers all over the Dominion, and his addresses to Farmers' Institutes and other gatherings. No one in this country has done so much as he to instruct the people in a practical knowledge of their worst insect foes and the best methods of dealing with them, while probably no one but he could have given the Province of Manitoba the information and the advice that he has repeatedly afforded by his lectures, addresses, and publications on the noxious weeds of that portion of the Dominion. All his friends will, we are sure, unite with us in the earnest wish that he may long be spared to carry on his admirable work, which is of such vast importance, not only to those directly interested in the products of the soil, but to all the dwellers throughout this wide Dominion.

A GENERIC REVISION OF THE LACHNÉIDÆ (LASIOCAMPIDÆ).

BY HARRISON G. DYAR, WASHINGTON, D. C.

The genera of the same regions are included in the present paper as in a former one on Hypogymnidæ (CAN. ENT., XXIX., 12). The palæarctic Lachneids of the old world have been admirably treated by Aurivillius (Iris, Dresden, vii., 121–185), and I am indebted to his work for valuable information, as well as to the works of Kirby and Hampson. In going over the literature I did not always confirm Kirby's types of the genera; but rather than disturb the matter again, I have accepted them as modified by Aurivillius; but with the restoration of Hübner's Tentamen names, I drop Gastropacha, as it is a synonym of Lasiocampa, being proposed in the same sense to include all the species of the family. Following Wallengren, I separate *catax* and *rimicola* from Eriogaster as defined by Aurivillius for convenience in the table, though I do not doubt that the venation is as variable as Aurivillius states (Iris, vii., 147). I cannot separate the new genus Paralebeda, Auriv., from Odonestis by anything that is stated.

The oldest plural term for the family is again Hübner's Lachneides, and must form the family name as shown by Grote.

The synoptic table is followed by a list of genera and species. Only those species are placed which I have either seen or could determine from recent works :

1. Secondaries with veins 7 and 8 from intercostal cell, the bar short, or vein 7 from the subcostal vein ..... 2.
   Secondaries with very large intercostal cell, vein 7 near 6 ; the bar long ..... 23.
2. Primaries ♀ long and narrow, apex produced ..... 3.
   Primaries broader ..... 5.
   Wings of female absent ..... 30.
3. Primaries with veins 8 to 10 stalked ..... *Bhima.*
   Primaries with vein 8 not stalked ..... 4.
4. Secondaries with veins 4 and 5 stalked ..... *Taragama.*
   Secondaries with veins 4 and 5 from the angle of the cell ..... *Suana.*
5. Costa of secondaries highly excised ..... *Lebeda.*
   Costa of secondaries slightly or not at all excised ..... 6.
6. Primaries with veins 6, 7 free or stalked ; 6 to 8 stalked ; 4, 5 of secondaries as above ..... 7.
   Primaries with 6 to 8 stalked ; 3 to 5 of secondaries stalked. *Syrastrena.*
   Primaries with veins 7 and 8 stalked. ..... 21.
7. Outer margin of primaries evenly rounded ..... 8.
   Outer margin of primaries crenulate ..... *Dendrolimus.*
   Primaries with the outer margin angulated and excised ..... *Bharetta.*
8. Palpi long ..... 9.
   Palpi short ..... 10.
9. Veins 6 and 7 of primaries from cell ..... *Arguda.*
   Veins 6 and 7 stalked ..... *Odonestis.*
10. Cell of both wings closed ..... 11.
    Cell of primaries closed, of secondaries open ..... 20.
    Cell of both wings open ..... *Trabala.*
11. Very large (80 to 110 mm.) ; primaries rather elongated .. *Pachypasa.*
    Smaller, primaries trigonate ; veins 4 and 5 of secondaries from the cell ..... 12.
12. Female with large, thick, hairy anal tuft ..... *Eriogaster.*
    Female without this tuft ..... 13.
13. Veins 9 and 10 of primaries on a stalk half way to apex or less ... 14.
    Veins 9, 10 on a stalk more than half way to apex of wing ..... 18.
14. Small species, wings short, 7, 8 of secondaries stalked from narrow and very small intercostal cell ..... 17.

Moderate sized, 7, 8 from distinct, elliptical, intercostal cell.....15.
Moderate sized ; veins 6 to 8 of primaries stalked..*Edwardsimemna.*
15. Sexes similar, wings broad.....16.
Sexes dissimilar, wings more elongate.....*Gloveria.*
16 Intercostal cell of secondaries half as long as discal cell..*Lasiocampa.*
Intercostal cell of secondaries shorter.....*Macrothylacia.*
17. Veins 4 and 5 of secondaries from angle of cell.....*Trichiura.*
Veins 4 and 5 of secondaries stalked.....*Chilena.*
18. Vein 8 of primaries from cell ; 4, 5 of secondaries from cell.....*Pœcilocampa.*
Vein 8 on a stalk ; 4, 5 of secondaries from cell ; antennæ short..19.
Vein 8 on a stalk ; 4, 5 of secondaries stalked.....*Hypopacha.*
19. Thorax evenly haired.....*Artace.*
Thorax or base of abdomen with a patch of long spatulate hairs.....*Tolype.*
20. Outer margin of both wings crenulate.....*Crinocraspeda.*
Outer margin entire.....*Malacosoma.*
21. Primaries with vein 6 from the cell.....22.
Primaries with vein 6 stalked with 7 and 8.....*Alompra.*
22. Female with a large abdominal tuft of hairs ; veins 4, 5 of secondaries from cell.....*Lachneis.*
Female without this tuft ; veins 4, 5 of secondaries stalked *Kosala.*
23. Primaries with the stalk of 9, 10 short, less than half way to apex..24.
Primaries with the stalk long, more than half way to apex.....27.
Primaries with the stalk reaching the apex, vein 10 absent.*Heteropacha.*
24. Primaries short, apex rounded.....*Lenodora.*
Primaries longer, apex square or acute.....25.
25. Palpi long.....*Cosmotriche.*
Palpi short.....26.
26. Outer margin of primaries crenulate ; head prominent..*Selenephera.*
Outer margin entire ; head sunken.....*Diplura.*
27. Secondaries with vein 3 from the cell.....28.
Secondaries with veins 3 to 5 stalked.....*Estigena.*
28. Palpi long; anal angle of primaries slightly emarginate.....29.
Palpi short ; anal angle of primaries with a square notch.*Epicnaptera.*
29 Primaries produced at apex,outer margin very oblique.*Stenophylloides.*
Primaries broader ; outer margin convex, crenulate.....*Eutricha.*
30. Fore wings of male with 12 veins ; female without woolly anal tuft.....*Eustaudingeria.*

Fore wings with 11 veins ; female with woolly anal tuft.. *Chondrostega.*

Bhima, Moore.
undulosa, Walk.
Taragama, Moore.
siva, Lef.
dorsalis, Walk.
Suana, Walker.
concolor, Walk.
Lebeda, Walker.
nobilis, Walk.
Syrastrena, Moore.
minor, Moore.
Dendrolimus, Germar.
pini, Linn.
Bharetta, Moore.
cinnamomea, Moore.
flammans, Hampson.
Arguda, Moore.
flavivittata, Moore.
bherola, Moore.
rosea, Hamps.
vinata, Moore.
rectilinea, Hamps.
decurtata, Moore.
albigutta, Walk.
Odonestis, Germar.
pruni, Linn.
hyrtaca, Cram.
punctata, Walk.
latipennis, Walk.
aconyta, Cram.
nanda, Moore.
fulgens, Moore.
lidderdahlii, Butl.
ampla, Walk.
undans, Walk.
repanda, Walk.
recta, Walk.
obliquifascia, Swinhoe.
plagifera, Walk.
Trabala, Walker.
vishnu, Lef.
irrorata, Moore.
Pachypasa, Walker.
otus, Drury.
Trichiura, Stephens.*
cratægi, Linn.
ilicis, Ramb.
khasiana, Moore.
Chilena, Walker.
similis, Walk.
strigula, Walk.
Gloveria, Packard.
arizonensis, Pack.
dentata, Hy. Edw.
olivacea, Hy. Edw.
venerabilis, Hy. Edw.
gargamelle, Strecker.
diazoma, Grote.
Howardi, Dyar.
dolores, Neum. & Dyar.
Lasiocampa, Schrank.
trifolii, Esper.
quercus, Linn.
Macrothylacia, Rambur.
rubi, Linn.
Edwardsimemna, Neum. & Dyar.
jalapæ, Hy. Edw.
Pœcilocampa, Stephens.
populi, Linn.
Artace, Walker.
punctistriga, Walk.

*This name should not be confounded with Trichura, Hubn., a genus of the Euchromiidæ.

Tolype, Walker.
velleda, Stoll.
distincta, Moore.
laricis, Fitch.
brevicrista, Dyar.
Hypopacha, Neum. & Dyar.
grisea, Neum.
Crinocraspeda, Hampson.
torrida, Moore.
Malacosoma, Hübner.
neustria, Linn.
franconica, Esp.
intermedia, Mill.
alpicola, Staud.
castrensis, Linn.
luteus, Oberth.
testacea, Motsch.
indica, Walk.
americana, Fab.
fragilis, Stretch.
pluvialis, Dyar.
ambisimilis, Dyar.
californica, Packard.
constricta, Stretch.
disstria, Hübn.
Alompra, Moore.
ferruginea, Moore.
Lachneis, Hubner.
catax, Linn.
rimicola, Hubn.
Eriogaster, Germar.
lanestris, Linn.
Kosala, Moore.
sanguinea, Moore.
modulata, Swinhoe.
rufa, Hampson.
flavosignata, Moore.
Heteropacha, Harvey.
rileyana, Harv.

Lenodora, Moore.
vittata, Walk.
signata, Moore.
semihyalina, Swinhoe.
Cosmotriche, Hubner.
potatoria, Fabr.
laeta, Walk.
divisa, Moore.
castanea, Hamps.
signata, Moore.
isocyma, Hamps.
pyriformis, Moore.
lineata, Moore.
Selenephera, Rambur.†
lunigera, Esp.
Diplura, Rambur.
loti, Ochs.
Estigena, Moore.
pardalis, Walk.
Epicnaptera, Rambur.
ilicifolia, Linn.
suberifolia, Dup.
tremulifolia, Hubn.
americana, Harr.
Dyari, Rivers.
Stenophylloides, Hampson.
sikkima, Moore.
Eutricha, Hubner.
quercifolia, Linn.
populifolia, Esp.
undulifera, Walk.
sinuata, Moore.
divaricata, Moore.
Eustaudingeria, Dyar.‡
vandalicia, Mill.
Chondrostega, Lederer.
pastrana, Led.
subfasciata, Klug.
farciana, Staud.
hyrcana, Staud.
palæstrana, Staud.

†Kirby (page 813) and Aurivillius are entirely at variance as to the type of this genus. I follow the latter author, not having seen the original work.

‡Staudingeria is preoccupied in the Pyralidæ.

NOTES UPON SPHINX CATALPÆ AT COALBURGH, W. VA.

BY W. H. EDWARDS, COALBURGH, W. VA.

I never had seen the imago of this species until the present year, and never saw the larva before 1896. Mr. Bruce tells me that it is a common species in parts of the Southern States, and that the eggs are laid in clusters, and the caterpillars are gregarious. In this paper I give simply my own observations. Early in August, 1896, I was asked what caterpillars were defoliating the Catalpa trees at Charleston, W. Va. It was said that some trees were completely stripped. I was unable to answer the question, as no caterpillar was shown to me. On my return home, I looked at my own Catalpa trees, and the first one that I happened on gave me a score or more of larvæ, one or two on a leaf, on the lower leaves of the tree. These larvæ were three to four inches long, and evidently had passed their last moult. One young tree, perhaps ten feet in height, with a top six feet in diameter, had been completely stripped of leaves. I found a single caterpillar of *Catalpæ* on it, to show what had done the mischief. I put the larvæ into a large flowerpot two-thirds filled with earth, and got, in a few days, some forty pupæ. Supposing these would go over to next year, I buried a few, and sent the rest to Mr. Bruce. In about two weeks he discovered that the imagoes had come out of his pupæ, and on examining mine the same result appeared.

On 4th October I discovered that a new brood of the larvæ was feeding, from one inch to one and three-quarters inches long; great numbers on a leaf. One had 23 larvæ on, and it seemed as if every leaf on the tree had more or less of them. I then went to a group of these trees at three hundred feet distance, and found both young and nearly full-grown larvæ; plenty of them. I reared thirty-six larvæ to pupæ, and all had changed by 23rd October. It was evident that there had been two broods of larvæ between middle of July and October, and it was probable that here was a most destructive species newly come into this region, that must have at least three broods in the season. I expected to see the trees stripped early in 1897, and that every Catalpa leaf thenceforward would have a struggle to live.

In spring of 1897 the first imago from these pupæ emerged 18th May, and by 25th I had nine, every one of them males. Of my 36 pupæ this was all the outcome. During the year I watched the Catalpa trees, but found no larvæ of the Sphinx, and no traces of them. The species, there-

fore, disappeared as suddenly as it came, and we hope to see it no more. I inquired in Charleston, but could learn of no appearance of the larvæ there. Certainly no Catalpa trees had been defoliated.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in London on the 12th and 13th of October last, when the following were elected officers for the year 1897-8:

President—Henry H. Lyman, M. A., Montreal.

Vice-President—Professor J. H. Panton, M. A., F. G. S., Guelph.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

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Ontario Agricultural College—Prof. J. H. Panton, Guelph.

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James Fletcher, LL.D., F.R.S.C., F.L.S., Ottawa.
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Delegates to the Western Fair—J. Dearness and W. E. Saunders, London.

Committee on Field Days—Drs. Woolverton and Hotson, Messrs. Anderson, Balkwill, Bowman, Elliott, Law, Rennie, Saunders, and Spencer, London.

Library and Rooms Committee—Messrs. Moffat, Bethune, Dearness, Saunders, and Balkwill.

ON CUTEREBRA EMASCULATOR, WITH DESCRIPTIONS OF SEVERAL ALLIED SPECIES.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Cuterebra emasculator, Fitch.—This species was supposed by Dr. Brauer to be the same as his *C. scutellaris*, but an examination of Fitch's type, now the property of the National Museum, discloses the fact that it is identical with *C. fontinella*, Clark. When describing the hairs of the thorax as yellowish, Dr. Fitch had evidently examined them in a very bright light, under which conditions they have a deceptive yellowish appearance, but in reality are altogether black.

The following five species, which appear to be undescribed, belong to the same group as *fontinella*, in which the hairs of the middle of the mesonotum are black. They may be tabulated as follows:

1. Abdomen wholly polished, destitute of pollen.....2.
   Abdomen partly opaque pollinose, hairs of pleura largely or wholly yellowish.....4.
2. Hairs of pleura largely yellowish.....3.
   Hairs of pleura wholly black.....*tenebrosa.*
3. Pleura with a cluster of black hairs above the centre, front of male three times as wide as the distance between the two posterior ocelli.....*nitida.*
   Pleura destitute of a cluster of black hairs, front of male six times as wide, etc.....*polita.*
4. With a cluster of black hairs above the centre of the pleura, front of male three times as wide as the distance between the two posterior ocelli.....*lepivora.*
   Without this cluster, front of male six times as wide, etc....*latifrons.*

Cuterebra lepivora, n. sp.—♂. Head black, destitute of light-coloured pollen, front at narrowest point three times as wide as distance between the two posterior ocelli, subopaque, an opaque streak of brownish pollen on each lower corner contiguous to the eyes, hairs of front black, several above the antennæ yellow; antennæ black, apical two-thirds of the arista and its hairs yellow; face and cheeks sub-shining, rugose, an opaque spot on each side of the face contiguous to the eyes, the hairs and those of the occiput pale yellow. Thorax black, subopaque, hairs of the dorsum black, a cluster above each wing and those of the pleura yellowish-white, a cluster of black hairs midway between the wing and the head; pleura opaque, two polished black spots above each front coxa; scutellum

black, its hairs also black. Abdomen shining steel-blue, the sides of the first three segments partly brown pollinose, on the second segment extending nearly half way to the middle of the dorsum, leaving numerous spots uncovered and polished, hairs of the abdomen, including those of the venter, black. Legs black, the femora toward their bases whitish pollinose, the hairs wholly black. Wings and calypteres brown.

♀. Same as the male, with these exceptions: Front nine times as wide as distance between the two posterior ocelli; face and cheeks smooth, opaque brownish pollinose, the upper part of the face and two spots each side, one of which is contiguous to the eye, the other nearly midway between it and the mouth, polished black. Hairs of venter of abdomen largely yellowish-white. Front femora each bearing a cluster of whitish hairs on the under side a short distance before the tip.

Length of male, 19 mm.; of female, 22 mm. One specimen of each sex. The female was bred by the writer from a larva found in a cotton-tail rabbit obtained near Anaheim, Cal. The male was collected July 28, 1896, at Corbett, Wyoming, by Mr. R. P. Currie.

Cuterebra nitida, n. sp.— ♂. Differs from the above description of the male of *lepivora* only as follows: Front subshining, two opaque spots of brownish pollen each side contiguous to the eyes; no yellow hairs above the antennæ. Abdomen wholly polished, destitute of pollen. Front tibiæ at base of outer side white pollinose. Length, 19 mm. Los Angeles Co., Cal. One specimen, collected by the writer in September.

Cuterebra latifrons, n. sp.— ♂. Differs from the above description of the male of *lepivora* as follows: Front at narrowest part six times as wide as the distance between the two posterior ocelli; two opaque spots of brownish pollen each side, contiguous to the eyes, face destitute of opaque spots. Pleura destitute of a cluster of black hairs. Abdomen reddish-brown, the last three segments partly covered with brownish pollen, leaving numerous spots uncovered and polished. Front tibiæ white pollinose on the base of the outer side. Length, 17 mm. Los Angeles Co., Cal. One specimen, captured by the writer in June.

Cuterebra polita, n. sp.— ♂. Same as *latifrons*, except that the lower part of the front and upper part of the face are narrowly bordered with gray pollen next the eyes, and the abdomen is violet-black, wholly polished and destitute of pollen, femora destitute of whitish pollen. Length, 16 mm. National Park, Wyoming. One specimen, collected August 3, by Mr. H. G. Hubbard.

Cuterebra tenebrosa, n. sp.—♂. Differs from *lepivora* as follows: Front at narrowest point five times as wide as the distance between the two posterior ocelli; two spots of brownish pollen on each side of lower part of the front next the eyes, and two on the sides of the face, but one or more of them sometimes wanting; hairs of the head and thorax wholly black. Abdomen wholly polished and destitute of pollen. Tibiæ white pollinose at the base of the outer side.

♀. Same as the male, except that the front is seven times as broad as the distance between the two posterior ocelli.

Length of male, 20 mm.; of the female, 20 to 22 mm. Colorado, San José (Mrs. A. E. Bush), and Siskiyon Co. (James Behrens), Cal.; and Perry, Oregon. Eight males and three females.

All of the specimens upon which these descriptions are founded are now the property of the National Museum.

FURTHER OBSERVATIONS ON PAPILIO BAIRDII, Edw.

BY W. H. EDWARDS, COALBURGH, WEST VA.

On the 8th of June, 1897, I received from Mr. David Bruce, at Glenwood Springs, Colorado, about 30 eggs, laid by a typical female of *P. Bairdii*, confined over the food plant, *Artemisia dracunculoides*. These soon began to hatch, and I gave them fennel, on which they thrived.

The first moult was passed on 13th and next days, the second moult on 15th and next days. Two passed the third moult on 17th, and the fourth on 19th and 20th. By 22nd all were past fourth moult. The first pupa formed 24th, and by 25th, a. m., there were half a dozen pupæ. The last larva pupated on 28th, and I had in all 16 pupæ.

The first imago came out 4th July, the last July 9th, and one pupa will go over to 1898 or 9.

The outcome was as follows:

1 typical *Oregonia* ♂.

1 " " ♀.

2 typical *Brucei* ♂, the cells of fore wings black instead of yellow, and the other characteristic marks of *Brucei* as set forth in my paper in Can. Ent.; also in vol. 3, Butt. N. A.

7 typical *Bairdii* ♂.

1 " " ♀.

Three pupæ dead.

Thus all three forms came from eggs of the single form *Bairdii* ♀.

TWO NEW SPECIES OF ORTHEZIA.

BY J. D. TINSLEY, MESILLA PARK, NEW MEXICO.

Orthezia cheilanthi, n. sp.—Adult ♀. Length, 3.5 mm. Width, 3–3.5 mm. Length + ovisac, 6–8 mm. Width of ovisac, 3–4 mm. Body above covered with white secretion, which forms lateral and subdorsal longitudinal keels. A well-defined subdorsal furrow between the keels and the lateral margin formed by 3 or more rows of plates; these are smaller than the projecting marginal plates, which are flattened; caudal plate and the 3 or 4 plates on each side of it very little longer than the lateral plates. The structure of the secretion is compact; in most of the other species of Orthezia it is fluffy.

Ovisac with distinct longitudinal ridges above and nearly as distinct ridges below.

Legs and antennæ sepia brown, of nearly same shade throughout. Tibia about as long as femur, tarsus about half as long as tibia, claw only slightly curved. Femur 532 μ, tibia 471 μ, tarsus 289 μ, claw 90 μ. Tibiæ and tarsi with several rows of spines. Antennæ (Fig. 1) with 8th joint longest, then 3rd, then 1st, then 4th, 5 and 7 next and subequal, 2 and 6 shortest and subequal. For measurements see figure. Formula 8314(57)(26).

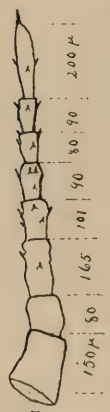


FIG. 1.

Derm with numerous small spines.

Larvæ.—♀. Legs and antennæ sepia brown.

Tibiæ decidedly longer than tarsi, claw long and slender, slightly curved.

Antennæ 6-jointed; 6 the longest, but not so long as 3+4+5; 3 usually longer than 4 or 5; 5 shortest. Formula 631245.

Habitat.—In Canons of the Organ Mts., New Mexico, on Cheilanthes Fendleri, Hook, at altitudes from 4,500 to 7,500 feet. The adult ♀ is usually found just beneath the surface of the soil, and the larvæ occur mostly upon the rachises of the fern.

Remarks.—This species is closely allied to *O. annæ*, Ckll., but differs from it in the following points:

(a) The secretion is more compact; the space between the subdorsal keels is wider and the keels are not so prominent. The marginal plates are more flattened.

(b) Colour of legs and antennæ is uniform, while in *annæ* the femora and tarsi are much darker than the tibiæ.

(c) In *annæ* joints 1 and 2 of antennæ are equal, and 3 is a third longer than 2, antennal formula being 83(12)(45)(67).

Orthezia graminis, n. sp.—Adult ♀. Length, 2–3 mm. Width, 2 mm. Length + ovisac, 6–13 mm. Width of ovisac, 2.5 mm. Colour, piceous. Body above with subdorsal and lateral keels; between the subdorsal and lateral keels the body is naked and shows up as a black band on each side, so that the dorsum appears to have three white longitudinal bands and two black longitudinal bands. Subdorsal keels slightly widest posteriorly. Lamellæ of lateral keels lengthening posteriorly. All the posterior lamellæ about subequal, and free from the firm chalk-white ovisac, which is longitudinally ridged dorsally and nearly smooth ventrally.

Legs and antennæ dark sepia brown.

Terminal segment of antenna darker than the others.

Tibia slightly longer than the femur; tarsus slightly more than half as long as the tibia.

Claw large, nearly straight. Femur 547 μ, tibia 593 μ, tarsus 320 μ, claw 83 μ.

Spines on tibia and tarsus small and not very numerous.

Antennæ (Fig. 2) with 3rd joint usually longest, although 3 and 8 may be subequal; 7th joint always the shortest; the other joints vary very much in their relative lengths in different specimens, so that no accurate formula can be given.

For measurements see figure. The antennæ have a few small, scattered spines.

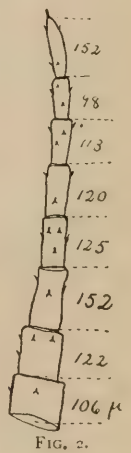


FIG. 2.

Larvæ.—The larvæ appear to have 3 black and 4 white longitudinal bands, since the body shows up black between the subdorsal, and the subdorsal and lateral keels. Legs and antennæ sepia brown. Tibiæ and tarsi about subequal in length, both shorter than the femure. Claw slender and curved. Antennæ 6-jointed; 6 longest, but not quite so long as 3 + 4 + 5; 2 and 4 usually longer than 3; all very variable in relative lengths, so that no formula can be given.

Male unknown.

Habitat.—On culms and blades of grass, in the Mesilla Valley, New Mexico. These specimens were collected near the A. & M. College Farm, Sept. 26, 1897.

This species is related to *O. sonorensis*, Ckll., and *O. nigrocincta*, Ckll., but has a much longer ovisac than either of these. The arrangement of the subdorsal lamellæ is also different, and more black shows on the dorsum than in either of those species.

NOTE ON TRIGONALYS CANADENSIS, Hargtn.

BY GEO. W. TAYLOR, F. R. S. C., GABRIOLA ISLAND, B. C.

Wishing to obtain a series of males of our common ground wasps, I paid a visit on the afternoon of October 21st to a large nest of *Vespa occidentalis*, Cresson, that I had noted some time previously near my house. The day was dull and the wasps sluggish, but quite a number of males and perfect females were crawling about around the entrance to the nest. Among the wasps were some specimens of a conspicuous yellow and black Hymenopteron unlike anything that I had seen before. I secured nine specimens, all males, aad on my return home easily made out by the help of Cresson's Synopsis that the insects belonged to the genus Trigonalys. The next step was to turn to Harrington's paper in the Can. Ent., XXVIII., page 108, and compare my specimens with the description of the unique *Trigonalys canadensis*. Unfortunately, all my specimens were males, while Harrington's type was a female. Consequently the description did not quite fit, but on the following day I took three females and satisfied myself that the species I had found was the genuine *T. canadensis*.

As the wasps' nest, and a second one not 50 yards away from it, were quite near to my house I was able to visit them several times each day, and my captures of Trigonalys were as follows :

At nest No. 1.	Oct. 21,	3 p. m.,	9 ♂.
	22,	3 p. m.,	2 ♂ and 2 ♀.
	24,	9 a. m.,	1 ♂.
	25,	3 p. m.,	1 ♂.
	26,	10 a. m.,	1 ♂.
At nest No. 2.	Oct. 22,	3 p. m.,	1 ♂ and 1 ♀.
	23,	9 a. m.,	2 ♂.
	24,	2 p. m.,	3 ♂.
	25,	10 a. m.,	1 ♂.
	25,	3 p. m.,	.. 1 ♀.
	26,	3 p. m.,	1 ♂.

On Oct. 27 the nests failed to produce any *Trigonalys*, but I captured one ♂ at rest on the leaves of an apple tree much frequented by wasps and growing about 100 yards away from the nests.

Total specimens, 23 ♂ and 4 ♀.

After the last-named date the weather became cold and wet, and no more Trigonalys appeared; so after waiting a day or two, I dug up the nests, but was not able to detect any signs of the parasites. It will be noticed that the flies were not commonly taken in the afternoons, and in all cases (except the solitary specimen on the apple tree) they were at rest on the grass and weeds within a few feet of the entrance to the wasps' nest.

The type of *T. canadensis*, as may be seen by reference to the paper above cited, was taken at Victoria (75 miles south of this place) from what was supposed to be the nest of the same species of Vespa (*V. occidentalis*) which had built a suspended nest on the under side of a veranda roof.

As the ♂ of *T. canadensis* differs from the ♀ in several details, I have asked Mr. Harrington to kindly append a description of the former sex to the present note. My 4 pairs of *T. canadensis* have been disposed of as follows: 1 to Dr. Fletcher, 1 to Mr. Harrington, 1 to the Entomological Society, and one reserved for my own collection. The remaining ♂ specimens will be gladly given to any hymenopterists who may care to ask for them.

ADDENDUM BY W. H. HARRINGTON, F. R. S. C., OTTAWA.

In accordance with the wish expressed by my esteemed friend in the foregoing most valuable note on the occurrence of these rare and interesting insects, I have prepared, from the three pairs submitted for inspection, a description of the male, for in the original description (as is evident) the word male should read female.

Trigonalys canadensis, Hargtn.—Male. This sex differs in general appearance from the female, chiefly in the larger and broader abdomen, which makes it look much more robust. The following differences are noted: Antennæ 19-jointed, with the pedicel rufous, and terminal joints sub-serrate, very much like those of the antennæ of a ♂ Vespa, but much slenderer. Mandibles more prominent, with the teeth rufous. The yellow markings of thorax are more conspicuous, and are as follows: Angle of prothorax; spot at each humeral angle of mesonotum, two lunate spots on scutellum, and a smaller spot on each side between scutellum and base of

anterior wing; post-scutellum and a short, paler line in the crenate suture at each side of the same; angles of the metathorax, and two minute dots on pectus. The abdomen shows an additional segment, although it—the seventh—is very small, and in one specimen scarcely visible. Viewed from above, the abdomen appears almost quadrate, and shows little more than the broadly flattened segments two and three, which are sub-equal in size, the terminal segments being deflexed and somewhat recurved under the venter. Segments two to five have broad yellow sub-basal bands, the edges of which are uneven; that on the first segment is almost bracket-shaped; the sixth segment also shows more or less yellow at base. The venter has double yellow spots on segments one to four, those on the first two being large and irregular in shape. The second ventral segment has a prominent median truncated projection, and the third segment has a similar projection, but it is almost hidden beneath segment two; segments four and five are visible only as narrow margins; the margin of the sixth segment is deflexed so as to form two sub-triangular keels in front of the projections from second; the seventh is cleft longitudinally. From the manner in which the terminal segments are deflexed and bent inwardly, these features are not readily seen in all specimens. Described from three specimens from Gabriola Island, B. C.

The three females accompanying these males are all somewhat larger than the type, two being much more robust; the markings are, however, identical, except that one of the larger specimens shows faintly the yellow dots (mentioned for the ♂) on front of mesonotum and on scutellum, and between it and the wings. The other shows only indications, still fainter, of the spots between the scutellum and wings.

The wasps sent by Mr. Taylor are female, worker and male of *Vespa occidentalis*, Cresson, and in examining them I notice that the eyes of the male are more remote from the mandibles than are those of the female. Mr. Taylor suggests that the wasp from whose nest the Victoria ♀ was taken was *V. Fernaldi*, Lewis, but I have not seen any examples of that species from Victoria.

MICROCŒLIA DIPTHEROIDES, Grote.

Larva.—Cylindrical, green, smooth, the setæ very fine and inconspicuous, single, normal for the Noctuidæ. White dorsal and subdorsal lines, narrow, crinkly edged; white dots at tubercles i. and ii.; a pink-red stigmatal line, edged with white below, distinct only at the ends of the body. (One blown specimen, Solidago, 5/9 '84, No. 3415. Coll. U. S. Nat. Mus.) This larva has no affinity with Acronycta.

Harrison G. Dyar.

A NEW PARASITE OF THE HARLEQUIN CABBAGE BUG.

BY L. O. HOWARD, WASHINGTON, D. C.

The great damage which has been done to cabbage and other cruciferous plants by the harlequin cabbage bug (*Murgantia histrionica*) in its spread towards the north-east renders of interest any comments upon its natural checks. Professor H. A. Morgan, of the Louisiana Agricultural Experiment Station at Baton Rouge, has reared in considerable numbers a Proctotrypid parasite from the eggs of this destructive insect, which was named by Mr. Ashmead *Trissolcus murgantiæ*. With commendable enterprise, Professor Morgan has sent eggs of the cabbage bug to various Experiment Station Entomologists situated in localities which the Murgantia has more or less recently invaded, and to which it seems probable that the parasite has not yet followed it. Professor Webster, of Ohio, has announced that he is trying to introduce this beneficial insect, and Professor Johnson, of Maryland, is making the same effort with Professor Morgan's help.

As preliminary to this introduction experiment, Professor Johnson has made an effort to ascertain whether *Murgantia histrionica* is already parasitized in its egg condition in Maryland. In the course of this effort he has bred several specimens of a Chalcidid parasite which he has asked the writer to name. Examination shows this insect to belong to the genus Encyrtus. It is interesting to note that no Encyrtinæ are known in Europe to live in heteropterous eggs. In this country, however, several species probably have this habit. Mr. Ashmead has reared a species from the eggs of *Anasa tristis*, in Florida, and in the Insectary of the Department of Agriculture at Washington species have been reared from the eggs of *Prionidus cristatus*, received from Texas, and from the eggs of an unknown heteropterous insect found upon pine in California. The species reared by Professor Johnson differs from any of these. It is very closely related to *Encyrtus mitratus*, Dalman, of Europe, the host relations of which are not known. The specimens in collections have been captured. It may ultimately prove to have been reared from heteropterous eggs.

As unsatisfactory as it is to describe isolated species, it is sometimes desirable, as in this instance. The parasite has some importance, and Professor Johnson wishes to refer to it definitely by name. The following description is therefore submitted :

Encyrtus Johnsoni, n. sp.

Female. — Length, 0.8 mm.; expanse, 2.1 mm. Belongs in the *E. mitratus* group. Antennal scape cylindrical; ovipositor scarcely extruded; wings hyaline, marginal vein lacking. Pedicel of the antenna three times as long as wide, nearly cylindrical, nearly three times as long as first funicle joint; first funicle joint a little longer than wide, remaining funicle joints increasing slightly in length; entire funicle subcylindrical; club as long as four preceding funicle joints together, somewhat swollen, ovate; entire flagellum slightly hairy. Body compact; thorax somewhat convex, abdomen rotund; mesonotum with short sparse white pile; vertex moderately narrow; ocelli forming right angle triangle; mesonotum finely transversely shagreened; mesoscutellum finely transversely shagreened at base, nearly smooth at tip; axillæ well separated at tip. General colour, metallic green; mesoscutum highly lustrous; axillæ and base of scutellum more opaque; tip of scutellum and abdomen shining; reflections of head violaceous; antennæ dark brown, nearly black; all legs uniformly light honey-yellow.

Male.—Closely resembles female, except in the following particulars: Antennæ, which are light brown in colour, have an obconical pedicel, of which the breadth nearly equals the length, and which is shorter than funicle joint 1; first funicle joint a little longer than second, remaining joints subequal in length; all of funicle and club with long hairs; club not widened and nearly as long as two preceding funicle joints together; abdomen broadly subtriangular.

Type No. 1424. U. S. Nat. Mus. (Coll. Dept. Agric.)

Described from two females, one male, reared by W. G. Johnson, College Station, Md., Aug. 22, 1897, from eggs of *Murgantia histrionica*.

NOTES AND OBSERVATIONS ON SEVERAL SPECIES OF DIPTERA.

BY F. M. WEBSTER, WOOSTER, OHIO.

Rhamphomyia mutabilis, Loew., has several times been observed preying upon *Bibio pallipes*, Say. I once saw hundreds of the former on a picket fence that had recently been whitewashed, and all appeared engaged in capturing the latter; at any rate hardly one could be found that was not engaged in sucking the life out of a victim. In one case the sexes were pairing while the female was lunching upon a recently captured Bibio.

Pipiza modesta, Loew., was reared from apple twigs infested by *Schizoneura lanigera* (Hausm).

Pegomyia bicolor, Weid., was reared from larvæ mining in the leaves of a species of *Rumex*.

Leucopsis bella, Loew., was reared from a melon louse, probably *Aphis gossypii*, Glover. Have reared apparently this species from Aphis on cherry.

From the same host was reared a species of *Cecidomyia*, the larvæ of which were observed feeding upon the Aphis. I have reared either this or a similar species from Aphis on plum leaves.

Masicera eufitchiæ, Towns., was reared from the larvæ of *Œnectra distincta* and *Teras minuta*, Rob., var. *cinderella*, Riley.

Euphorocera clavipennis, Maq., was reared from larvæ of *Datana ministra*, Dru.

Paraplagia spinosula, Bigot, was reared in numbers from larvæ feeding on alder. The host was the larvæ of some species of Sawfly, the adult of which was not reared.

The determinations were made by Mr. Coquillett by courtesy of Dr. L. O. Howard.

A NEW ORTHEZIA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Orthezia artemisiæ, n. sp.— ♀. Immature form. Antennæ and legs piceous. Body covered with white secretion. Dorsum with two rows of dentiform tufts; the first four directed forwards; the remaining seven, decreasing in size caudad, directed backwards. Nine lateral tufts; the first, on a level with the second dorsal tufts, at right angles to the body; the others directed backwards, and about of equal length, except the last two, which are longer and narrower, the last being longest. Caudal tufts extending caudad of last lateral tufts.

♀.—Mature. Differs by having the lamellæ or tufts more elongated, the first dorsal erect, longer than broad; the remaining dorsal produced and no longer dentiform. The arrangement is now practically as in adult *O. urticæ* (L.), except that the first dorsal lamellæ are wide apart at tips, and the second dorsal lamellæ are smaller (instead of larger) than the third. The hindmost lateral lamellæ are also somewhat less produced than in *urticæ*. Antennæ and legs dark red-brown; antennæ 8-segmented, 3 longest; 5 a little longer than 4; 6 and 7 about equal, and shorter than

4 ; 8 about as long as 5. Length of insect, without ovisac, 2½ mm. Ovisac moderate, white, distinctly ribbed.

Hab.—Embudo, New Mexico, Sept., 1897, on sage-bush (*Artemisia*), together with *Dactylopius lichtensioides*, Ckll. (new to N. M., empty sacs only found), and *Lecaniodiaspis artemisiæ*, Ckll., MS. (♀ scale 3 mm. long, reddish ochreous, tuberculate, dull, thoracic region with two prominent transverse crests ; antennæ apparently absent in adult, in younger examples represented by small rounded bristly prominences, without visible joints.)

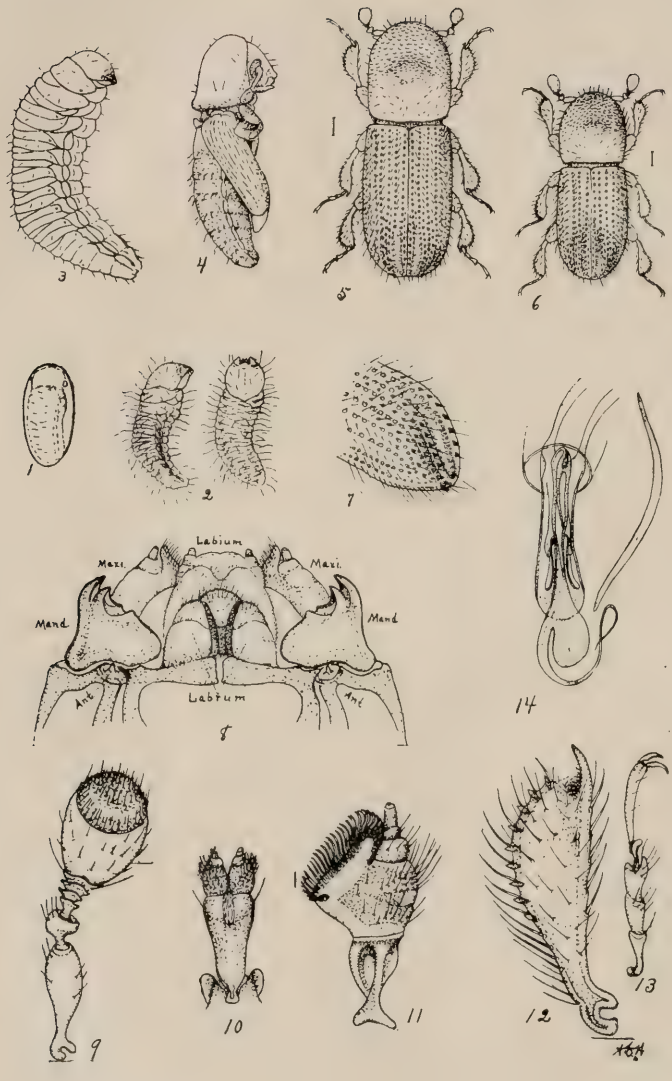
At Embudo I found also *Orthezia nigrocincta*, Ckll., on *Gutierrezia* high up on the cliff. With the two new species just described by Prof. Tinsley, and the present insect, New Mexico now possesses five species of *Orthezia*. *O. artemisiæ* is nearest to *O. annæ*, but the latter has the lamellæ less definitely formed, and differs also in the antennæ.

BOOK NOTICE.

INSECT LIFE : AN INTRODUCTION TO NATURE STUDY AND A GUIDE FOR TEACHERS, STUDENTS, AND OTHERS INTERESTED IN OUT-OF-DOOR LIFE.—By John Henry Comstock, Professor of Entomology in Cornell University and in Leland Stanford Junior University. With many illustrations, engraved by Anna Botsford Comstock. New York : D. Appleton & Company ; pp. 349, with six plates and many figures. Price, $2.50.

In this little book Prof. Comstock has given us a treatise, not only of practical value to teachers and amateurs, but also one that the professional worker will find very handy to have just within reach, in order to settle some minor point that may suddenly present itself. Best of all, however, is the fact that the work is correct—a feature quite in contrast with some of the ordinary text-book entomology. There need be no hesitation about recommending this book to anyone, as its style, while not especially technical, is even more or less poetical, yet is never flippant or slipshod in expression. The illustrations are fine, and are not simply pictures, but help to simplify the text—almost anyone who is at all versed in entomology will at once recognize the Katydid on the cover. There is just one fault to be found with the book, and it is very doubtful if this is to be attributed to the author, and this is the title. A fascinating title may help to sell a novel, or some such work as that, but publishers should learn that this is not true with such books as this. However, it is no discredit to the author that his book should be found better than its title. For the present, and until there is something much better, I shall recommend this book to those who wish for a simple and accurate introduction to the difficult study of entomology. F. M. W.

Mailed January 10th, 1898.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The Canadian Entomologist.

VOL. XXX. LONDON, FEBRUARY, 1898. No. 2.

ON THE HISTORY AND HABITS OF THE "WOOD ENGRAVER" AMBROSIA BEETLE—XYLEBORUS XYLOGRAPHUS (SAY), XYLEBORUS SAXESENI (RATZ.) —WITH BRIEF DESCRIPTIONS OF DIFFERENT STAGES.*

BY A. D. HOPKINS, ENTOMOLOGIST, W. VA. AGR. EXPT. STATION.

The Ambrosia beetles of the Scolytid genus Xyleborus present many features of interest to the student of systematic and economic entomology[1], and in *Xyleborus xylographus* we find a cosmopolitan species of unusual interest.

History.

It was described by Say in 1826[2] from specimens "sent to him by the younger Rev. J. F. Melsheimer from the Melsheimer collection, with the manuscript names and notes by the elder Rev. F. V. Melsheimer."[3] Say's erroneous reference to the habits and galleries of the species, published with the description, was (as suggested by Schwarz) due to his use of Melsheimer's notes on a different species, probably a Pityophthorus, Pityogenes or Tomicus species. This was the cause of much confusion in subsequent literature on the species. The *Tomicus xylographus* referred to at length by Dr. Fitch[4], and subsequently quoted by Packard[5] under *Xyleborus xylographus*, was evidently *Tomicus cælatus*, although the galleries illustrated by Fitch resemble the work of a Pityophthorus more than they do that of *T. cælatus*.

Some years after the publication of Say's description, Ratzburg described the same thing under the name *Xyleborus saxeseni*, which,

*Read by title before the W. Va. Academy of Science, Arts and Letters, Dec. 7th, 1897.

1. Ambrosia Beetles of the United States; H. G. Hubbard; Bull. No. 7, new series, U. S. Department of Agriculture, Div. of Entomology, 1897, pp. 9–30; also Year Book, 1896, pp. 421–430.

2. Bostrichus xylographus, Jour. Acad. Nat. Sci., Phila., 1826, Vol. V., p. 256.

3. Catalogue of Insects of Pennsylvania, 1806.
Quotation from Schwarz in Proc. U. S. Nat. Museum, Vol. XVIII., p. 610.

4. *Tomicus xylographus*, Fitch, 4th Rep. Ins. of N. Y., 1858, p. 716.

5. Bull. 7, U. S. Ent. Com., Insects Injurious to Forest and Shade Trees.

according to Eichhoff[7], was in use in Europe over fifty years before it was determined that Say's name had priority. Schwarz[8] had previously called attention to the probable priority of Say's name, and the confusion with reference to Say's description of the insect and galleries. The writer[9] also referred to its identity with *saxeseni* in 1893, and published brief descriptions of the male in 1894[10]. This, with descriptions and notes by Zimmermann and Leconte[1], and the publications previously cited, includes about all of the literature in this country, but in Europe the literature is more voluminous and includes, under the synonym *X. saxeseni*, quite full accounts of its habits and distribution.

Geographical Distribution and Host Plants.

According to Eichhoff the distribution of this species extends over "the greater part of Europe, Canary Islands, Japan (?), and North America." The species is evidently indigenous to Central Europe, or wherever it infests the greatest variety of trees. Its recent or remote introduction into any country will probably be indicated by its preference for certain introduced or ornamental trees, and the extent to which it has acquired the habit of infesting indigenous trees.

In Europe, Eichhoff and other observers found that it not only infested the wood of oak, beech, birch, maple, poplar, linden, fruit, and other deciduous trees, but that different conifers were also attacked by it. Hubbard mentions that "it appears to be partial to rather hard wood, like oak, hickory, birch and maple, and is found wherever these trees grow, both in this country and Europe." The results of my observations here in West Virginia would indicate that it is confined almost exclusively to fruit trees, especially to the wood of the apple, in which I have found it to be exceedingly common in the vicinity of Morgantown. In my extended

6. Ratzburg Forstein, 1837, Vol. I., p. 168.

7. Letter from W. Eichhoff to Dr. C. V. Riley in 1892, published in Proc. U. S. Nat. Museum, Ibid p. 609, from which we quote the following: "There cannot be the slightest doubt that the species you sent me as *Xyleborus xylographus*, Say . . is identical with the European *X. saxeseni*, Ratzburg It is certainly remarkable that this synonymy comes to light only now, and that Ratzburg's name has to be suppressed after it has been in use for more than fifty years. *X. pini*, Eich., must now again take its rank as a distinct species."

8. Ento. Amer. II., p. 41.

9. Bull. 31, W. Va. Agr. Expt. Station, p. 136.

10. Sexual Characters in Scolytidæ, CAN. ENT., Vol XXVI., p. 279. The male had been previously described by Wisemann, Stett. Ent. Zeit., 1846, p. 24.

1. Trans. Amer. Ent. So., Sep. 1868, p. 145 and 160.

search for wood and bark beetles of all kinds in different sections of the State, I have only one record of this species or its work in the wood of an indigenous tree, and that was in a hemlock drift log, near an old orchard in which the insect was abundant. Fitch, Leconte and Packard referred to the abundance of *X. xylographus* and *Tomicus xylographus* under the bark of pine, but they were evidently referring, as Say did, to the habits of *Tomicus cælatus*, which, while a true bark-boring beetle, is also a wood engraver.

Breeding and Feeding Habits.

The habits of *X. xylographus* are quite fully and accurately described by Eichhoff[1], and recently Mr. Hubbard, in his excellent paper on the ambrosia beetles of North America, has contributed additional information, especially with reference to the ambrosia fungus upon which it feeds, from all of which, together with what I can add from personal observations, we are enabled to present the following :

The fertilized females pass the winter in their brood chambers and emerge in the spring (April and May, near Morgantown, W. Va.). They are then attracted to sickly, dying or felled trees, in the living or moist dead wood of which they prefer to excavate their brood galleries. A crevice or opening in the bark, such as may be made by other insects, or, as I have observed, those made by the yellow-bellied woodpecker, but more commonly the edge of a wound, or a dead place on a living tree, is selected as a favourite point of attack. Here a female will commence the excavation of a mine, and after she has penetrated the wood a short distance, another female (as I have observed) will come to her assistance, one working at the excavation, while the other guards the entrance and assists in expelling the borings. The primary or main gallery is usually extended into the heartwood before eggs are deposited. When the primary gallery is completed (according to Hubbard) a bed is provided on the sides of the gallery for the propagation of the special species or variety of ambrosia fungus which is to furnish food for the future broods. The first set of eggs are few in number (five to ten) and are placed without any protection on the sides near the end of the main gallery, or in cavities or short branching galleries (Plate 3, fig. 7, 8), one-half to one inch from the end, where, upon hatching, the young larvæ find a supply of ambrosial food. After the first set of larvæ have attained considerable size, another set of eggs are deposited, and so on at intervals until a

1. W. Eichhoff, European Barkenkafer, Berlin, 1881, pp. 280–281.

large family is reared, in which eggs, larvæ of all stages of development, pupæ, and young and old adults are found crowded promiscuously in leaf-like brood-chambers, which are continually broadened or extended by the adults and possibly by the larvæ, to make room for the increase. It appears that the brood-chambers are broadened and extended by the adults, and that the borings, mixed with the fungus, are softened and furnish additional food for the larvæ and young beetles.[1]

Mr. Hubbard records the discovery of a death chamber, or a kind of catacomb, in which the dead mother beetles and other dead friends or foes of a large colony are consigned by the survivors. In some fresh specimens of galleries before me (Plate 3, fig. 2 b b), I find the same thing, but it appears that in addition to a resting place for the dead, it is also utilized for the disposal of all objectional and refuse matter, which, owing to the crowded condition of the chamber, cannot be conveniently expelled from the entrance. One of the males found in this set of chambers was excavating a burrow in the mass of material in the death or garbage chamber. Whether he was excavating his own tomb, or simply providing bachelor quarters, I cannot say.

The proportion of males in this, as in all other species of the genus Xyleborus, is remarkably small. There are usually not more than three males in the largest colonies, or groups of brood-chambers. It would appear from observations made by Swiner and Eichhoff in Germany, and the numerous colonies I have examined in this country, that there is, on an average, about one male to twenty females. The males have no wings, therefore probably do not leave the brood-chambers, but remain with the over-wintering colony until all have emerged in the spring. They are then left to be smothered in overabundant ambrosial food, or to the tender mercies of predatory insect enemies which had previously been prevented from entering the brood-chambers by one or more female sentinels at the entrance. A few females may emerge from time to time during the summer to start new colonies, but from the excessively crowded condition of the brood-chambers during the fall and winter months, it

1. NOTE.—In a brood-chamber before me just cut from a near-by apple tree, I find a pupa minus an abdomen. No predaceous enemies can be found, but two or three half-grown larvæ are in such a position as to make the circumstantial evidence quite plain that they are to blame for the mutilation. The remaining portion of the pupa is in a normal condition, which would indicate that the attack had been recent and when the victim was alive. This would also indicate that the helpless pupa may furnish food for the larva in case of a scarcity of ambrosia, or that they may be thus disposed of to prevent an overcrowded brood-chamber.

would appear that the older adults of the broods excavate branching chambers in which new broods are developed, and that in these old and new chambers they all pass the winter.

Enemies.

A number of predaceous beetles and their larvæ may find their way into the brood-chambers at unguarded moments and destroy a portion or all of the colony. This, like other species of ambrosia beetles, appears to be aware of the danger from this source, at any rate, from the time the first eggs are deposited until all the individuals of a colony have developed and emerged from the brood-chambers, one or more adult females serve on guard duty at the entrance, where their armed elytral declivity (as shown in Plate 2, fig. 7 ; Plate 3, fig. 9) completely fills the entrance gallery, thus presenting an impenetrable barrier against intruders. It is therefore only at unguarded moments that the enemy can enter, except, perhaps, the very young, microscopic larvæ of the predaceous beetles, which may possibly pass the sentinels unobserved. This guard duty is an interesting feature of intelligence in the habits of all Scolytids. In the case of bark beetles and other species in which the sexes are about equally divided, the male is the sentinel, while the female excavates the brood gallery. Perhaps there is no better example of unselfish devotion to paternal duty than the male bark beetles, since they not only spend their lives on guard, but die at their posts in order that their dead bodies may continue to blockade the entrance to the brood galleries. In Xyleborous, and others in which the females greatly predominate, one or more females serve on guard duty.

The excessively crowded brood-chambers doubtless offer favourable conditions for diseases, which may, as indicated by evidence before me[1], destroy an entire colony.

Relation of the Insect to the Health of the Trees Infested by It.

Eichhoff[2] was undecided as to whether or not the species did any damage to the trees infested by it, but mentioned that it might prove destructive to orchards or nursery trees. Hubbard[3] states that it " breeds only in dying trees," but does much injury to the timber, causing defects in the wood, and the writer[4] mentioned that it probably hastens the death

1. In a brood-chamber before me a number of dead larvæ and pupæ are found, which have evidently died quite recently from a disease of some sort which cannot at present be studied or determined.
2. European Bark Beetles, l. c.
3. Ambrosia Beetles of North America, l. c.
4. Bull. 31, W. Va. Agri. Expt. Sta., l. c.

of injured trees. Recently specimens were received from Dr. Fletcher with the following statement in the letter accompanying them :

" I now send you a few specimens and will ask you for a line or two on them. It is named *Xyleborus saxeseni* by European specialists, and is doing considerable harm to plum trees in England. Miss Ormerod showed me the work and gave me the specimen. I told her . . . I would submit it to you. . . . It was alive, with several others of different ages, in a large flat cavity in a plum branch two inches in diameter."

The evidence I have been able to obtain from a somewhat extensive study of the habits of this and other species of Xyleborus, leads me to conclude that while they must have moist wood in which to develop a brood and propagate the fungus upon which they feed, they all have a decided preference for that of dead, dying, or at least unhealthy trees, be they standing or felled, and in no instance have I found any species of the genus entering the wood of any part of an uninjured and healthy living tree. Even *X. dispar*, which has been recorded as infesting healthy wood of fruit trees in Europe and this country, has not been observed by me in healthy wood, although I have found examples of a species determined by Eichhoff as *X. dispar* in the wood of a great variety of trees in West Virginia[1]. *X. xylographus* comes nearer to attacking healthy wood of living trees than any other species I have observed. It will attack living trees, and has been frequently found in apparently healthy sapwood, but in such instances it had entered through the dead or dying wood of a wound or dead spot in the bark of the trunk or branches, as shown in Plate 3, fig. 1.

Even if it did attack perfectly healthy trees, it could scarcely be the primary cause of their death, unless the insects should occur in such vast numbers as to completely fill the sapwood with entrance galleries and brood-chambers, which in large trees is hardly possible, and in small trees not at all probable. In fact, they seem to prefer to excavate their brood-chambers in the heartwood, which, as is well known, is not a vital part of the plant structure. If the healthy living sapwood is penetrated at

1. This statement is not meant to even suggest the inaccuracy of the records of other writers, since I have reasons for doubting that the species I observed is a true *X. dispar*, and even if it is, habits of the same insect may differ under different environments.

all, it is usually by the primary or entrance galleries, which could cause only the slightest detriment to the vitality of the tree. The most vital part of a tree (the healthy living cambium) is seldom if ever touched by these insects, since they make their entrance through the dead bark or wood. If they did penetrate the healthy cambium, it would be no more than a pin-hole, which, even in great numbers, could scarcely do harm, since in healthy, growing trees such wounds would rapidly heal.

This and other insects with like habits may, however, hasten or even insure the death of unhealthy trees, since their entrance galleries may contribute to the attack of harmful micro-organisms (bacteria and fungi) which are ever ready to attack exposed plant tissue, and especially if the vitality of the growing parts becomes in the slightest degree impaired. This, it would seem, is the only way in which *X. xylographus* could affect the vitality of the trees infested by it, but to what extent it may do so is a problem for future investigation. It may, however, as suggested by Hubbard, be the cause of serious defects in lumber manufactured from trees or logs containing its pin-hole galleries and broad, leaf-like brood-chambers.

Preventives and Remedies.

From what is known of the habits of the insect, it would appear that the best methods of preventing its attack is to keep all fruit trees in nurseries and orchards in a vigorous, healthy condition, and during the winter, or previous to the first of April each year, destroy by fire all the unhealthy or dying or dead branches on trees, thus destroying the colonies before they emerge in the spring. Wounds or dead places on valuable trees may possibly be protected from the attack by the removal of the dead bark and painting the dead surface, especially the edges, with a strong solution of soap and water, undiluted kerosene emulsion, melted grafting wax, or like substances.

Different Stages Briefly Described.

(See Plate 2.)

Egg (fig. 1): Length, .52–.55 mm.; width, .24–.26 mm.; yellowish to pearly white; shining; ovate.

Larva, first stage (fig. 2.): Length, .60–.66 mm.; width, .20–.22 mm.; white; head broader than thoracic segments, and yellowish, with pale brown mandibles; body slender, narrowing to last abdominal segment; head and each segment clothed with long, fine white hairs, longest on the last three abdominal segments. Intermediate stage: Length, 1.5–1.8

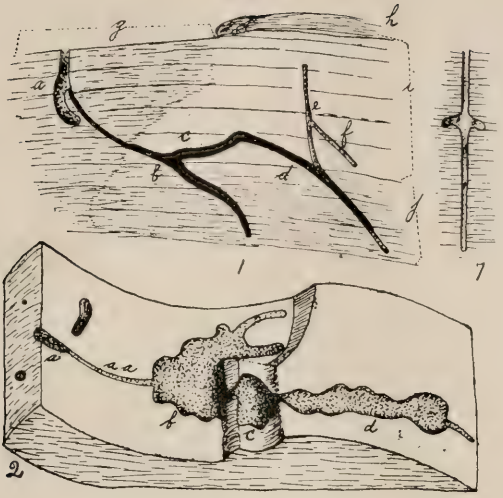
mm.; width, .50–.55 mm.; yellowish-white; slender; thoracic and abdominal segments to seventh equal width (dorsal to ventral) and narrowing from seventh to last; hairs fewer and shorter than in first stage; head with brown, longitudinal line in front and short longitudinal groove above; mouth-parts darker. Matured larva (fig. 3.): Length, 2.8–3 mm.; width (lateral view) about .88 mm. at third thoracic segment and seventh abdominal, and .80 mm. at second to third, and narrowing from seventh to .30 mm. at last abdominal; colour, yellowish-white to yellow; head darker, with dark brown mandibles and brown longitudinal line, depression less than in intermediate stages; body stouter, thoracic segments much larger and head much smaller in proportion to body than in first and intermediate stages; segments and head sparsely clothed with short, fine hairs; mouth-parts as shown in fig. 8.

Pupa ♀ (fig. 4.): Length, 2.4–2.5 mm.; width (lateral) about .8 mm.; colour, yellowish-white to yellow; prothorax with dorsal posterior margin elevated, forming a conical hump; mesoscutellum prominently elevated and slightly bent forward; wing pads extended to posterior ventral margin of the fourth abdominal segment, the tips meeting or sometimes separated by a narrow space; antennæ prominent, tip of clubs extending beyond the middle of the front coxæ and to the base of the front tibia; hind tarsi with tips extending to tips of wing pads. The hairs, with which the front, the lateral and dorsal surface of the prothorax and dorsal surface of the abdominal segments are sparsely clothed, are fine and do not rise from tubercles.

Pupa ♂: Length, 2 mm.; width (lateral) .7 mm.; easily distinguished from the female pupa by its smaller size and bent form; the abdomen is narrower and the tip bent down until it is even with the ventral edges of the wing pads; the hairs are fewer but stiffer and longer than on the female pupa.

Imago ♀[1] (fig. 5): Length, 2.3–2.5 mm.; width (dorsal) .73–.74 mm.; colour varies from yellowish-brown to black; easily distinguished from all other known species of the genus by its size and the sculpture of the elytral declivity and the regular rows of small teeth on the first, third, fourth, and sometimes the fifth interspaces, as shown in fig. 7. There is considerable variation in colour and in the number and rows of teeth.

1. Female—*Bostrichus xylographus*, Say, 1826, l. c.
Bostrichus saxeseni, Ratzburg, 1837, l. c.
Tomicus dohrnii, Woll., 1854, Ins. Mad., p. 290.
Xyleborus dryographus, Ferrari, 1867, Barkenk., p. 20.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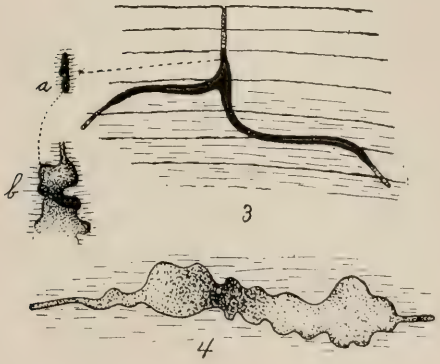
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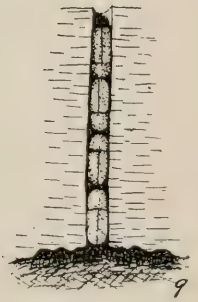
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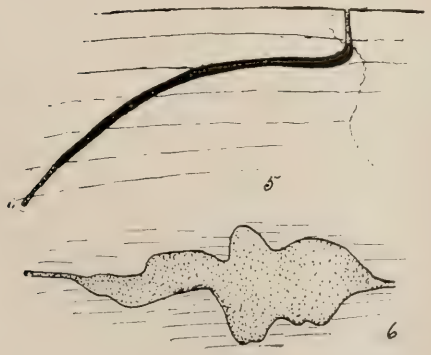
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Imago ♂ (fig. 6): Length, 1.66–2 mm.; width (dorsal) .86–.88 mm.; easily distinguished by its general resemblance to the female, its small size, slightly flattened and bent form.

Galleries (Plate 3, fig. 1): Width of entrance on primary galleries, .8–.9 mm.; width of brood-chambers from 1 to 20 mm.; length, 1–7 mm.; diameter, .9–1.1 mm.

Explanation of Plates.

Plate 2.—1. Egg x 25 diameters. 2. Larva, 1st stage, x 25 diameters. 3. Matured larva x 12½ diameters. 4. Pupa x 12½. 5. Imago ♀ x 15. 6. ♂ x 15. 7. Elytral declivity x 25. 8. Mouth-parts of larvæ x 100. 9. Antenna x 100. 10. Labium x 100. 11. Maxilla x 100. 12. Front tibia x 100. 13. Tarsus x 100. 14. Genitalia x 50.

Plate 3.—1. Entrance gallery and brood-chambers in transverse section: a, gallery of *Stenoscelis brevis*, Bok., utilized by *X. xylographus;* b 1st, c second, d third, brood-chambers; e, incompleted exit gallery; f, branching gallery evidenly for a fourth brood-chamber; g, dead and partly dried wood; h, living bark; i, living sapwood; j, heartwood; slightly curved transverse lines represent annual growths of wood.

2. Same as fig. 1 in vertical section; 2 b, 1st brood-chamber, showing death or garbage chamber at b b.; 3 and 4, transverse and vertical view of set of brood-chambers all in living and partly living wood; 5 and 6, entrance in dead wood, brood-chamber in living wood; 7, primary gallery with two egg chambers; 8, egg chamber enlarged; 9, female sentinels as found at *aa*, fig. 2; 10, ambrosia fungus. All original and from fresh or living material except 10, which is after Hubbard.

2. Male—*Bostrichus saxeseni*, Wiesm., 1846, Stett., Ent. Zeit., p. 24.
Bostrichus decolor, Boield, 1859, Ann. Soc Ent. Fr., p. 479.
Xyleborus aescuii, Ferrari (1867?), Barkenk., p. 22.
Xyleborus subdepressus, Rey, Rev. d'Ento. par Fauv. 2, 142.
Xyleborus xylographus, Hopk., 1894, CAN. ENT., vol. XXVI, p. 279.

PANURGINUS CLYPEATUS.

In CANAD. ENTOM., 1897, p. 290, I referred the *Calliopsis clypeatus*, Cresson, to *Panurginus*. I had considered it probable that *Panurgus clypeatus*, Eversmann, 1852, was really a *Panurginus*, but was not sufficiently sure to venture upon changing the name of our insect. There has just come to hand, however, an excellent little monograph of the palæarctic species of *Panurginus*, by Mr. H. Friese, and on p. 19 the Eversmann species is definitely referred to that genus. *P. clypeatus* (Cress.) may therefore be called *P. cressoniellus*, n. n.

Mesilla Park, N. M., Jan. 11, 1898. T. D. A. COCKERELL.

FOUR NEW SPECIES OF PHLEPSIUS.

BY CARL F. BAKER, AUBURN, ALA.

Phlepsius areolatus, n. sp.

♀.—Length 6.5 mm. Form of *cinereus:* Head narrower than pronotum. Vertex distinctly angulate, a little longer than half width between eyes or half the length of pronotum; nearly flat, slightly broadly depressed on either side, the edge distinctly compressed. Front a half longer than wide, nearly two and a half times the length of the clypeus, sides rather strongly incurved at antennal sockets. Clypeus gradually enlarged towards the truncate tip, its length once and a half the width at tip. Width of pronotum nearly two and a half times the length, surface neither punctured or wrinkled.

Colour cinereous. Vertex with two large fulvous clouds, a triangular black spot either side of tip, and two black dots at base. Ocelli large, white. Clypeus with two black dots near tip, loræ and genæ irregularly dotted, and front with poorly-defined arcs. Pronotum anteriorly with four indistinct fulvous blotches, posteriorly and scutel irrorate with fulvous. Elytra milky white, veins dark brown, the supernumerary veins distinct and numerous; the other dark colouring bordering the cells, but usually not touching the veins, producing a strongly areolate appearance; with darker costal dots. Legs with the following more conspicuous markings: Fore femora with a black spot before near the apex, fore tibiæ with three black spots before; behind both are heavily irrorate with black; middle femora with a longitudinal black stripe behind, middle tibiæ trimaculate; hind femora and tibiæ with a longitudinal stripe before. Sternum with three dark spots on either side. Venter, except along the middle and dorsum, irrorate with dark.

Last ventral segment twice the length of preceding, hind margin truncate, with a small median notch; lateral angles rather sharp.

The type specimen of this interesting species was collected at Onaga, Kansas, by Mr. F. F. Crevecoeur. It is very distinct from anything in the *spatulatus* group.

Phlepsius personatus, n. sp.

♀.—Length 6 mm. Form very closely resembling that of *spatulatus*, but smaller. Head narrower than pronotum. Vertex very obtusely angulate, length three-fifths of width between eyes, or somewhat over half the length of the pronotum; surface gently convex, evenly rounded on to the front, entirely without a compressed edge. Front nearly a half longer

than wide, two and one-half times the length of the clypeus, sides gently incurved at the antennal sockets. Clypeus gradually enlarged towards the truncate tip, basal suture obsolete. Width of pronotum scarcely two and one-fourth times the length, surface sparsely punctured.

Colour pale cinereous. Head washed with fulvous, with few dark marks, but the arcs on front distinct; antennal pits, eyes, and a narrow longitudinal area on the pleura back of eyes, dark brown, giving the insect a very unique appearance. Pronotum obscurely irrorate with fulvous. Basal angles of scutel broadly fulvous. Elytra milky white, vermiculations very fine, faint, and evenly distributed; without supernumerary transverse veins; legs without marks, except the usual dots at bases of spines.

Last ventral segment twice the length of preceding, hind margin truncate, with a small median notch; lateral angles very obtuse.

Described from a single specimen collected at Yuma, Ariz., July 6th, 1897, by Prof. A. P. Morse. This species resembles a small *spatulatus*, which is its nearest relative, but differs in size, colour and genital characters.

Phlepsius texanus, n. sp.

♀.—Length 7.5 mm. Form nearest to that of *punctiscriptus*, which it also resembles in some other characters. Head slightly broader than pronotum. Vertex little produced, very obtusely angulate, length one-third of the width between the eyes, or somewhat more than one-third the length of the pronotum; surface sloping, slightly transversely depressed, meeting the front in a very obtuse angle, edge not at all compressed. Front a third longer than wide, sides evenly curved from the vertex to the clypeus, not at all bent opposite the antennæ. Clypeus slightly enlarged towards the truncate tip, length once and three-fourths the width at tip. Width of pronotum once and seven-eighths the length, surface obscurely punctured.

Colour cinereous, with a faint fulvous tinge on vertex, pronotum, and scutel. Vertex irrorate with brown, face dark fulvous, except numerous small round light dots all over, and several larger light spots on front; the ocelli in white dots. Pronotum coarsely irrorate with brown, more strongly so in an irregular band between the hind angles of the eyes. Scutel with two black dots on each lateral margin. Elytra milky, and, except in frequent small irregular areas, marked with fine dots and very fine vermiculations, the latter short, rather few in number and radiating from

the veins, without supernumerary transverse veins. Commissural and apical costal margins each with two larger dark spots. Femora more or less completely heavily triannulate with dark, the fore and middle tibiæ more or less completely quadriannulate ; hind tibiæ with large dots at bases of spines and tip, black.

Last ventral segment once and a half times as long as preceding, hind margin black and slightly sinuate, hind angles narrowly, somewhat acutely, produced nearly a third the length of the segment.

♂ more slender. Length 7 mm. Plate short, broadly triangular. Valves short, each about as broad as long, outer edge obtusely angled below, tips bluntly rounded, far exceeding the extremely short pygofers.

Described from several specimens in the National Museum collection, from Texas. This species is very distinct from any described North American form. It resembles *punctiscriptus* somewhat, but differs in structure of head, genitalia of both ♀ and ♂, and in markings.

Phlepsius Rileyi, n. sp.

♀.—Length 7.5 mm. Nearest *texanus*. Head slightly broader than pronotum. Vertex rather strongly angularly produced, length little less than one-half of the width between the eyes, or about one-half the length of the pronotum ; surface sloping, slightly transversely depressed, meeting the front in a very obtuse angle, edge not at all compressed. Front somewhat less than a third longer than wide, sides evenly curved from vertex to clypeus, not at all bent opposite the antennæ. Clypeus slightly enlarged towards the truncate tip ; length once and three-fourths the width at tip. Width of pronotum nearly twice the length ; surface sparsely punctured.

Colour pale fulvous. Markings as in *texanus*, except paler and more uniform on vertex, and no indications of a band on the pronotum ; the whole insect of a more distinctly fulvous cast.

Last ventral segment twice the length of the preceding, entire hind margin in two large evenly rounded lobes, the notch between them V-shaped.

Described from material in the National Museum, collected in Texas. This species has no relative nearer than the *texanus*, from which it differs in proportions of head and pronotum and in the genitalia. The genitalia of the female resemble somewhat those of *incisus*, but that species differs widely in form and coloration. Named after Dr. Riley, in whose collection it first occurred.

NOTES ON COLLECTING "AT LIGHT."

BY A. W. HANHAM, WINNIPEG, MAN.

Until last year (1897), owing to the lack of suitable surroundings, I had made no attempt at systematic collecting "at light." Now, as the result of this one season's capture, I am firmly convinced that this method of collecting is the very best way in which to make a large collection quickly and to secure in abundance species hitherto rarely met with or entirely new. For all night-flying species no other way of collecting has ever proved so profitable with me, and a short account of my experiences, with notes of some of the captures made, may be of interest. To begin with, this was my fourth collecting season in Manitoba, but until this year the good things taken at light were few and far between. Locality is everything, and my surroundings in previous years consisted of too much brick and mortar and too little of nature's clothing. At the end of May this year I moved to Fort Rouge, a suburb of Winnipeg, situated between the Red and Assiniboine Rivers. Formerly the whole of this was "bush," with some good timber along the river banks. I am glad to say that a goodly portion of Fort Rouge is still "bush," with here and there a little clearing, sufficient to allow of a residence or so; sometimes just enough only for the house, which when the trees are in full foliage may be completely shut in. Where I live the place is more settled, but still plenty of thick bush about, here and there, if only in small pieces. In June my yard (out of politeness perhaps it should be styled garden) was full of wild rose bushes, the flowers of which adorned our tables and perfumed our rooms for more than a month. The children stepped outside the back gate to pick flowers and wild strawberries; at the side of the house and along the roadway in front on both sides, white clover was everywhere in profusion, and the air was laden with the scent. And yet the road is block-paved, and the electric cars pass along it, and a ride of eight minutes on my wheel will take me to my office in the heart of this city of 40,000 or more people.

I may say here that all my collecting "at light" was done from an upstairs window—that of my sanctum—facing nearly west; at one side of the window is a small poplar, and on the other, further away, close to the house is a good-sized oak tree, denuded of most of its boughs, and a few other small trees. What will some day (all too soon) be a road along the side of the house is still covered with bushes, with here and there a tree. To the right looking out of the window are three arc lights, all within

about 100 yards of the house, the nearest perhaps not more than 50 yards from the front door. What effect these lights had on my collecting is entirely conjectural; sometimes I have been inclined to think that it was owing to the quantity of things drawn to the neighbourhood by them that I did so well; at others, that owing to their superior brilliancy or attractiveness I got but a small share of the things that were flying, in which case the quantity of insects around these electric lights some nights must have been enormous. I must confess that sometimes a wish entered my mind that these lights would go out, so that my small one might have no opposition.

Enough of the surroundings, now for the experiences or results.

My first venture was made on the evening of the 27th of June, and with the exception of a few nights when the moon shone too brightly, I tried light nearly every evening, for a longer or shorter time, according to "the profits," until I went to Brandon, Man., on the 5th of August. On my return at the end of that month I resumed collecting in this way until well on in September, but the weather was very unfavourable and I took little, as compared with the July catches; the nights were either too light outside or too windy, and during the whole month no rain fell, so that the conditions can hardly be said to have been suitable, not affording a fair test. Though I am well satisfied with the gifts showered upon me, it is still a matter of regret that I did not commence a month earlier in the season and that I lost nearly the whole of August as well, for I have no doubt that I missed many a good thing not yet represented in my collection.

It was owing to my inability to get out for any day or evening collecting during June (due to pressure of business and domestic disarrangements) that I bethought me of collecting "at light"; had it been otherwise, I dare say my light collecting would never have seen a beginning, nor a continuation, had not I met with such unexpected, surprising and encouraging success at the outset.

The very first captures at light on June 27th were Leucania albilinea, and Plusia Putnami and striatella; these were followed after an interval by Plusia insolita and ampla; the Sphingidæ were represented by Smerinthus geminatus and Paonias excæcatus; the Bombycidæ, by Cerura occidentalis, Tortricidia testacea, several species of Schizura, Edema albifrons, Nadata gibbosa, Notodonta elegans, Pheosia dimidiata, Crocata immaculata by the dozen, etc.; the Noctuidæ, besides those already men-

tioned, included such nice things as Pseudothyatira cymatophoroides, Charadra deridens (1), Diphthera fallax (1), Raphia frater, in plenty, several species of Acronycta, Micrococlia, Rhynchagrotis, and a fair proportion of common things; the Geometridæ were also well represented, such hitherto rare species (with me) as Metanema inatomaria and Phasiane mellistrigata being among the commonest, while several large, handsome species put in an appearance; these are new to my local list and still await identification. The "Micros" were almost without number, and selection was a difficult matter. My diary records that the evening was warm and moist, and that it was 3:30 a. m. before I sought my couch.

June 28th was another good evening, while it lasted, but I retired at a much earlier hour.

June 30th: I have called this a beetle evening in my diary, nothing else coming in until quite late. Agonoderus pallipes was a nuisance, as were also several species of small water beetles; among the good things were some species of Lebia, a new "Longhorn," weevils, etc.

July 1st was another capital evening, my notes say; three species of Sphingidæ new to the district—one of these was Sphinx albescens; more new Bombycidæ, including Phyllodesma americana, etc.

July 2nd: On this evening the Sphingidæ stayed at home, or at any rate remained outside, but their place was well filled by more Plusia striatella (5) and ampla (2); also another insolita; Putnami and æreoides were plentiful; Abrostola urentis and Deva purpurigera also made their first call; Metathorasa monetifera was more timid, only one putting in an appearance, and this species did not occur again. Two species of Caradrina were taken, miranda and punctivena—the latter being quite abundant—also Noctua Treatii (3); Pyrrhia exprimens, Leucania commoides and Cucullia florea were well represented. Carneades divergens and Mamestra lorea came in in such numbers as to be almost a nuisance. The Bombycidæ included a single Halisidota maculata and Argryrophyes cilicoides; the latter species I understand is quite a rarity.

July 3rd: Arctia virgo and Dryopteris rosea came in first on this date. On the 5th my diary records the running out of pins and the making of new setting-boards, as one result of the quantity of "stuff" taken.

July 6th: A Dryopteris irrorata gladdened my eyes on this evening. (The second one of these caught came in on the 8th.)

July 7th: Pallachira bivittata, a handsome and very rare "snout" moth, appeared on the scene. I got two; during the next few evenings I took more of them; in all, six being secured.

July 8th: The most noticeable things were Ceratomia undulosa and several large species of Acronycta and Mamestra.

July 9th: The first species of Ichthyura, namely, albosigma, was captured on this evening.

The next few evenings were too light outside and I got little, but I mention the capture on the 10th of Crambidia pallida; this species became fairly common later on in the month.

July 15th: This evening I took four fresh Plusia bimaculata and some striatella, several Mamestra assimilis and Hadena impulsa, a fine Cerura occidentalis, Clisiocampa fragilis, more Dryopteris rosea, and another pair of the tiny white Bombycid, Argryrophyes cilicoides, etc.

July 18th: Another Cerura, Arctia Saundersii, Carneades flavicollis and silens, and Orthosia Conradi (?) were among my visitors this evening.

July 19th: This was my record evening of the season, and one in another way as well, it being 4 o'clock when I put out my light and retired for the night (?). It was another wet night, and stormy at intervals. I was first of all deluged with mosquitoes, and a small green tree-hopper; these were soon joined by swarms of Crambidæ, among which Crambus unistriatellus was the most conspicuous. The larger moths included a dozen or more of the two species of Arctia already recorded, half a dozen Parorgyia plagiata, three species of Ichthyura, Cerura cinerea (the only example taken), more of the little white Bombycid, several species of Schizura and Ianassa lignicolor; the three specimens of the moth last named appeared on the scene almost at the same moment. Some of the common Noctuids,such as Feltia jaculifera, Noctua fennica and haruspica, Hadena lignicolor, Mamestra lilacina, Hydræcia nictitans, and others, were becoming troublesome. This was a great evening for Noctuids; some of the particularly showy species were Hadena adjuncta and miseloides, Trachea delicata, Mamestra lubens, Plusia striatella, bimaculata and viridisignata (1), the last Plusia being an addition to my local list. I also took one Acronycta hamamelis, and impressa was quite plentiful. Senta defecta turned up for the first time, and in extraordinary abundance; I could easily have bottled 100 of them; a Tineiid, somewhat smaller, but mimicking this species in colour and markings, was nearly equally common. In Geometers, I got six or more Plagodis rosaria—previously represented in my collection by a single specimen, taken at Brandon in 1896—and several large green Geometers, for which I have not yet succeeded in getting a name; and there were many other species.

[TO BE CONTINUED.]

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXVIII. The Cerambycidæ of Ontario and Quebec.

Liopus, Serv.

Resembles the preceding genus in form, but the angulation or tuberculation of the prothoracic flanks is better marked. The Canadian species are few. Mr. Leng has thus defined them, following, in the main, a previous arrangement of Dr. Horn :

A. Front flat, mouth in same plane. Elytra without angular mark posteriorly, sides of thorax arcuate, the spine small and acute. Elytra without erect scales. .24–.48 in..... *variegatus*, Hald.

AA. Front convex, mouth slightly retracted ; lateral spine of prothorax rather distant from base. Elytra without distinct tufts of erect scales.

b. Elytra with an acutely angular band behind the middle, which is, however, sometimes wanting.

Surface finely punctured, almost impunctured behind the band. .16–.28 in..... *alpha*, Say.

Surface more coarsely punctured, very distinctly so behind the band. .16–.28 in..... *cinereus*, Lec.

bb. Elytra with a feebly marked post-median band of whitish pubescence in place of the angulate line. .20–.25 in.. ..... *punctatus*, Hald.

Liopus alpha and *cinereus* are united by Mr. Leng under the former name, the differences given above becoming evanescent in long series. *L. variegatus* is said to breed in box elder, *L. alpha* in apple, and *L. cinereus* in hickory and locust.*

Lepturges, Bates.

In this genus the spine of the prothorax is quite near the base. The following table has the same origin as the preceding :

A. Lateral spine of prothorax rather broad, very close to the base. Colour usually pale with short gray pubescence, black markings as follows: Four spots on the thorax, two on each elytron near the base and close to the suture, a lateral stripe before the middle connected with a broad irregular transverse band, and three (often

*In the table of genera the genus *Leptostylus* is said to have the prothorax "fully tuberculate." It should read "feebly tuberculate."

united) spots near apex arranged in the arc of a circle. These markings may vary in either direction, so that specimens may be nearly black or almost entirely pale. .28–.36 in. . *symmetricus*, Hald.

AA. Lateral spine more slender, less close to base, tip recurved. Elytra fasciate with black.

b. Post-median fascia incomplete, broadly interrupted at suture. .24–.36 in. . . . . *signatus*, Lec.

bb. Post-median fascia entire, not interrupted, broad.

Fasciæ oblique on each elytron, apex not black. .18–.24 in. . . . . *querci*, Fitch.

Fasciæ transverse, apex also black. .12–.16 in. . *facetus*, Say.

A few notes have been published on food habits: *L. signatus* has been found on dead sumach twigs, *L. querci* on oak, butternut and hickory, *L. facetus* on juniper. The last has also been bred from beech and hickory.

Hyperplatys, Hald.

H. aspersus, Say, and *H. maculatus*, Hald., occur in Canada, according to the Society List. They are considered by Mr. Leng as races of one species, which should be called by the former name. The ground colour appears to be of a brownish or bluish-gray, the upper surface maculate with numerous small roundish black spots. For convenience the characters on which the names are based are copied from Dr. Horn.

Elytra twice as long as wide at base. Antennæ in both sexes at least twice as long as the body. . . . . *aspersus*, Say.

Elytra broader, not twice as long as wide. Antennæ not reaching twice the length of the body in either sex . . . . . *maculatus*, Hald.

Length, .14–.26 inch. Breeds in poplars and apple twigs.

Acanthocinus, Steph.

Only one species occurs with us, *A. obsoletus*, Oliv., found about pine lumber. It is a grayish beetle, .40–.60 in. long, the elytra coarsely, not closely, punctured, with a rather indistinct raised line (costa) on each. The ornamentation consists of a number of small dark blotches and three undulated elytral bands, which are often more or less broken up. The resemblance to some beetles of neighbouring genera is quite close, so that careful reference should be made to the characters given in the preceding table.

GRAPHISURUS, Lacordaire.

The Canadian records include *G. fasciatus*, DeG., and *G. triangulifer*, Hald., but it is quite likely that the latter reference is incorrect, the species being more essentially southern, and occurring from Missouri and Ohio to the Gulf States.

Stouter, pubescence of upper surface mostly ochreous. Prothorax pale at sides, this pale area enclosing a few small black spots; median stripe broad, dark, and in turn enclosing three (2 sub-apical, 1 sub-basal) ochreous spots. Elytra with ochreous pubescence marked by many very small black spots, especially towards the sides, scutellar area black, as is also a sub-humeral blotch, a large many-angled, intensely black post-median blotch, not extending quite to the suture, and a sub-apical angulate mark. Tarsi equal in width in both sexes. .52–.54 in. ..... *triangulifer*, Hald.

More elongate, pubesence of upper surface chiefly grayish, except for dark markings, which consist of small, closely-placed spots and blotches. These form a tolerably distinct line on each side of the middle of the prothorax, and usually also an ante-median and post-median irregular elytral fascia. Anterior and middle tarsi of male broader than in female. .32–.56 in. (Fig. 3.) ..... *fasciatus*, DeG.

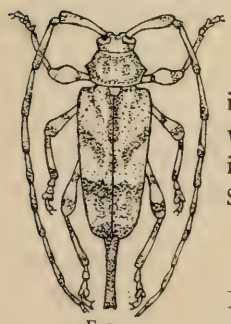

FIG. 3.

G. fasciatus is common in the lake regions, and is said to breed in oak and maple. *G. triangulifer* was found in the larval state boring under bark of injured hackberry trees *(Celtis texana)* by Mr. Schwarz.

CERATOGRAPHIS, Gahan.

Here belongs *C. biguttata (Liopus biguttatus*, Lec.), which is unknown to me. Aside from the generic characters, it is stated to be "elongate, scarcely depressed, testaceous, pubescence brownish. Elytra indistinctly mottled, each with an oblique black band behind the middle." Length, .36 in.

DORCASCHEMA, Lec.

Represented in Canada by *D. nigrum*, Say, which has been bred from hickory limbs. It is easily recognized by the long antennæ, entirely black colour and cylindrical form, the prothorax tubularly narrowed behind the middle, and with rugose disk. The elytral punctures are clear

and deep, not very large nor crowded. Under surface clothed with pale pubescence, which gives a leaden effect. Length, .32–.40 in.

ONCIDERES, Serv.

The "hickory girdler," *O. cingulatus*, Say (fig. 4), is the only Canadian species. It is variable in colour, but the northern forms will approximate the following description: Brownish or reddish yellow, prothoracic spine blunt or wanting; elytra with a broad transverse band of (usually) cinereous pubescence and with scattered yellow spots, these latter sometimes forming tolerably regular rows. Length, .56–.68 in. Dr. Hamilton says that it occasionally girdles pear, apple, plum, linden, elm, and various other trees.

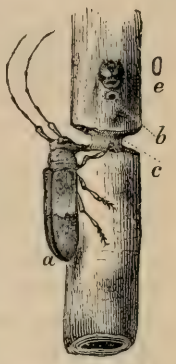

FIG. 4.

AMPHIONYCHA, Lec.

A. flammata, Newm., is .24–.38 in. long, black, clothed with erect dark hairs, the head with two yellow spots or stripes; the sides of the thorax are broadly, those of the elytra (usually nearly to tip) narrowly, yellow. The elytral punctuation is very close and coarse. Antennæ clothed with long hairs. Care should be taken not to mix this species with *Eupogonius subarmatus*, which it very closely resembles.

SAPERDA, Fabr.

All of the North American species have been found in Canada, so we reproduce entire the table given by Dr. Hamilton in Trans. Am. Ent. Soc., XXIII. The larvæ of all mine in living trees, hence they are extremely destructive.

A. Elytra separately acuminate at tip. Colour yellowish-brown, with oblique darker bands. .64–.76 in..... *obliqua*, Say.

AA. Elytra rounded at tip, with an acute sutural spine. Pubescence cinereous, variegated with fulvous (or nearly uniform brownish-yellow in the var. *adspersa*, Lec.), shot with numerous black denuded points, thorax vittate. 1.00–1.25 in... *calcarata*, Say.

AAA. Elytra obliquely narrowed and prolonged at tip, slightly dehiscent, coarsely punctate. Pubescence thin, cinereous, variegated with fulvous patches. Thorax trilineate with fulvous. Antennæ conspicuously annulated with white. .36–.60 in..... *mutica*, Say.

AAAA. Elytra rounded at tip.

b. Elytra vittate or with lateral stripes.

FIG. 5.

Pubescence silvery white; thorax and elytra with three broad pubescent brown vittæ. .60–.80 in. (Fig. 5.) ..... *candida*, Fabr.

Pubescence cinereous; head and thorax with bright yellow pubescence, six black denuded spots on thorax. Elytra with broad marginal and sutural stripe bright yellow. .37–.40 in.. *puncticollis*, Say.

Pubescence grayish. Elytra with broad submarginal stripe, and sometimes also the suture narrowly yellowish-scarlet. A broad stripe on each side of thorax. Surface colour piceous, punctures coarse. .36–.60 in..... *lateralis*, Fabr.

Pubescence grayish. Elytra with broad submarginal stripe (extending also along sides of thorax) yellowish-scarlet, connected with which are three oblique bands, which may reach the suture or be reduced to mere short projections, surface colour piceous, punctuation finer. .36–.52.. *tridentata*, Oliv.

bb. Elytra with white pubescent spots. Surface brown.

Thorax with two white stripes, besides a narrow discal white line. Elytra each with two large white spots, sides of under surface white. .40–.80 in. *cretata*, Newm.

Thorax with two white stripes, no discal line. Elytra each with a humeral and two subsutural white spots, sometimes becoming obsolete in the male. Under side altogether or with sides white. .40–.48 in. ..... *fayi*, Bland.

bbb. Elytra each with three small denuded spots, sometimes wanting. Pubescence dense, uniformly olivaceous or yellowish-brown. .48–.76 in..... *vestita*, Say.

bbbb. Elytra with a transverse undulate fascia; surface colour piceous to ferruginous, punctuation coarse and deep. .60 in..... *discoidea* (♀), Fabr.

bbbbb. Elytra unicolorous, not variegated.

Thorax with a broad denuded stripe each side of the median line. Piceous to ferruginous, under side with dense grayish-white pubescence. .40 in..... *discoidea* (♂), Fabr.

Thorax with a denser line of gray pubescence each side, black, coarsely punctured, pubescence thin, grayish or (in Pacific Coast specimens) fulvous. .32–.36 in. ..... *mœsta*, Lec.

Thoracic pubescence uniform. Black, densely clothed throughout with cinereous pubescence, less coarsely punctured. .44–.48 in. ..... *concolor*, Lec.

Some of the recorded food plants of the species of Saperda are as follows: *S. obliqua* has been found in the adult state on black alder; *S. calcarata* breeds in various poplars and in basswood; *S. candida* in apple, crab apple, mountain ash, juneberry and hawthorn; *S. puncticollis* in poison ivy; *S. lateralis* in hickory, elm and witch-hazel; *S. tridentata* chiefly in elm, also in maple; *S. cretata* and *S. fayi* in thorn (*Cratægus*); *S. vestita* in basswood; *S. discoidea* in hickory and butternut; *S. mœsta* in poplars; and *S. concolor* in poplars and willows.

Eupogonius, Lec.

Three species are known from Canada. They may be known thus:

A. Elytra black, punctuation coarse quite to apex. Thorax black, with a broad line of yellow pubescence near each lateral margin. .28—.32 in. ..... *subarmatus*, Lec.

AA. Elytra piceous or castaneous, punctuation finer or even obliterated towards apex; Elytra castaneous, punctuation finer, almost obliterated at tip; pubescence grayish or yellowish, forming reticulations. .28—.32 in. ..... *tomentosus*, Hald.

Elytra piceous, punctuation stronger, pubescence luteous, forming small mottlings or patches. .24—.36 in. ..... *vestitus*, Say.

Of these, *E. subarmatus* bores in elm, *E. tomentosus* in pine and hickory, *E. vestitus* in hickory.

Hoplosia, Muls.

Represented by *H. nubila*, Lec., which is described by the author as being .35 in. long, blackish piceous, polished, irregularly clothed with short, dense cinereous pubescence, thorax with acute lateral spine, elytra with large, closely placed punctures anteriorly, tip rounded. It lives on basswood.

Pogonocherus, Latr.

Two small blackish species belong here. They are variegated with whitish or grayish pubescence, and the elytra are truncate, more or less dentate at tip. *P. penicillatus*, Lec., is .24 in. long, blackish; elytra with

sub-basal band of grayish pubescence, well marked lateral costæ, and with a row of five or six tufts of erect black setæ. *P. mixtus*, Hald., is .20–.28 in. long, much resembling the former species, but the lateral costæ of the elytra are indistinct and the tufts wanting. The extent of the pubescent bands is variable. The elytra are clothed with erect black bristles, in addition to the short pubescence. Bred from dead willow branches, and found also on pear trees, while I have taken it quite abundantly on poplar logs.

ECYRUS, Lec.

E. dasycerus, Say, has been bred from dead hickory limbs by Dr. Hamilton. It is from .24–.32 inch long, brownish or cinereous, thorax without well-marked tubercles, disk with two longitudinal approximate dark lines, usually rather indistinct. Elytra with black arcuate band near base, a number of black points (consisting of bundles of hairs) arranged in series, and a common indistinct white band behind the middle, which may sometimes be wanting. The antennæ are hairy beneath.

OBEREA, Mulsant.

Contains very elongate, cylindrical species, easily recognized by their facies. Some of them are quite variable in colour, and hence the number of names proposed is in considerable excess of the species now recognized. Mr. Leng has tabulated them according to structural characters, leaving only three specific names to cover all the recorded Canadian forms, thus :

Thorax with four callosities ; pygidium of female strongly protuberant. .45–.60 in. . . . . *Schaumii*, Led.

Thorax with two callosities ; pygidium of female feebly protuberant. .32–.70 in. . . . . *tripunctata*, Swed.

Thorax without callosities ; elytra densely pubescent. .60–.70 in. . . . . *ruficollis*, Fabr.

The colour varieties of *tripunctata* are thus separated by Mr. Leng ; *amabilis* is said to scarcely differ from *mandarina* :

Body beneath black ; legs nearly or quite black.

Thorax yellow, with two discal and an antescutellar spot black . . . . . *tripunctata*, || Fabr.

Thorax yellow, with two discal spots alone black. *bimaculata*, Oliv.

Body beneath in great part yellow ; head yellow, thorax with two discal and an antescutellar spot black. . . . . *mandarina*, Fabr.

Most of the species of *Oberea* are found about raspberry and blackberry, in the canes of which they bore. However, *O. Schaumii* and *O. mandarina* breed in twigs of cottonwood.

TETRAOPES, Serv.

Moderate sized, stout insects, with short antennæ and strongly tuberculate thorax. They are found on *Asclepias*, the common milkweed, in the stems and roots of which they are said to breed. The two Canadian species may be known thus :

Smaller (.32–.48 in.); body beneath, legs and antennæ, black. Above red; scutellum, four spots on the thorax and elytral markings (a spot on the umbone, a large median heart-shaped blotch and broad common apical space), black. These markings are liable to some variation through extension or diminution ..... *canteriator*, Drap.

Larger (.36–.56 in.); ground colours and thoracic ornamentation about as in the preceding species, the front angles and basal margin sometimes also dark. Elytra with umbonal, two antemedian (one subsutural, one discal) and one post-median spot on each, black ..... *tetraophthalmus*, Forst.

The bibliography of the North American Cerambycidæ is very extensive. Aside from detached descriptions of species and biological notes, the following papers, which are more or less synoptic or monographic in form, are recommended for consultation :

1847. Haldeman, S. S. Materials towards a history of the Coleoptera Longicornia of the United States. Trans. Am. Phil. Soc. Additions and corrections to same, Proc. Am. Phil. Soc., Vol. IV.

1850–1852. Leconte, J. L. An attempt to classify the Longicorn Coleoptera of America north of Mexico. Jour. Acad. Nat. Sci., Phila.

1873. Leconte, J. L. New species of North American Coleoptera, Part II., Smithsonian Institution. Contains tables of several genera.

1878. Horn, Geo. H. Notes on some genera of Cerambycidæ of the United States. Tr. Am. Ento. Soc.

1880. Horn, Geo. H. Notes on some genera of Cerambycidæ, with descriptions of new species. Tr. Am. Ento. Soc.

1885. Horn, Geo. H. Descriptions of some new Cerambycidæ, with notes. Tr. Am. Ento. Soc.

1884–1890. Leng, C. W. Synopses of Cerambycidæ. Begun in Bulletin Brooklyn Ento. Soc., Vol. VII., continued in Entomologica Americana, Vols. I.–VI. Contains tables of all genera up to and including the Lepturoides. The remainder are treated in a paper, cited below, by the same author in collaboration with Dr. Hamilton.

1890. Casey, Thos. L. Coleopterological Notices, II. Ann. N. Y. Acad. of Science. Tables of *Ergates* and *Tragosoma*.

1891 Casey, Thos. L. Coleopterological Notices, III. Ann. N. Y. Acad. of Sci. Contains synopses of several of the smaller genera.

1893. Casey, Thos. L. Coleopterological Notices, V. Ann. N. Y. Acad. Sci. Tables of four genera.

1896. Leng, C. W., and Hamilton, John. The Lamiinæ of North America. Trans. Am. Ento. Soc.

THE MONTREAL BRANCH.

The 211th regular monthly meeting of the Montreal Branch of the Entomological Society of Ontario was held on 11th January, at 74 McTavish street; Mr. Henry H. Lyman, president, in the chair. Dr. James Fletcher, F. L. S., F. R. S. C., the Government Entomologist, had come down from Ottawa to attend the meeting, and gave a full and most interesting account of the San José scale, the insect pest which is so destructive to the fruit-growing industry, and the introduction of which into Canada from infected nurseries in the United States has caused such widespread alarm. Dr. Fletcher gave an account of its life history, described the features which distinguish it from other and comparatively harmless scale insects, and the most approved remedies for controlling and, if possible, exterminating it. A hearty vote of thanks to Dr. Fletcher was unanimously passed. The President read a letter from Mr. John G. Jack, now of the Arnold Arboretum of Harvard University, who still keeps up his membership in the Branch, announcing the donation of three valuable United States Government reports to the library of the Branch. A cordial vote of thanks to Mr. Jack was unanimously adopted. The President read a paper entitled "Further Notes on the Genus Chionobas," illustrated with specimens of nearly all the known species and varieties from this continent, as well as some from the Old World. After discussion and the examination of many interesting specimens, among them some brought back by the Hudson's Bay expedition from the far north, the meeting adjourned.

NEWS OF THE DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

The collection of insects of the U. S. National Museum at Washington is rapidly increasing. A great donation, the details of which have just been completed, is the large Hubbard and Schwarz collection of Coleoptera. This is one of the first collections of Coleoptera in the United States. It comprises from 10,000 to 12,000 species brought together by Messrs. Hubbard and Schwarz during the last twenty-five years. It has especial value from its fine condition and accurate labelling, affording possibly the best source of information regarding geographical distribution. This collection adds about 3,000 species to the collection of Coleoptera of the Museum. It contains a moderate number of types, but a large number of co-types of the species described by Leconte and Horn. It also contains some exotics, notably a good collec-

tion of West Indian micro-Coleoptera, and is practically unique in its large series of coleopterous larvæ and pupæ in alcohol.

The death of Mr. M. L. Linell, in the spring of 1897, was a severe blow to the Department, but a rearrangement has been effected by which an excellent working force has been secured. The Department has been extremely fortunate in attaching to it Dr. Harrison G. Dyar. Since the departure of Dr. John B. Smith there has practically been no Lepidopterist in Washington, and Dr. Dyar's advent is especially welcome. He has entirely rearranged the collection of Lepidoptera, and has deposited in the Museum his own large collection of some 15,000 specimens. The force as at present constituted is: L. O. Howard, Honorary Curator; Wm. H. Ashmead, Assistant Curator and Custodian of Hymenoptera; Harrison G. Dyar, Custodian of Lepidoptera; E. A. Schwarz, Custodian of Coleoptera; D. W. Coquillett, Custodian of Diptera; and R. R. Currie, Aid.

For a department which has bought no large collections, the Department of Insects is rich in type material. The catalogue shows the existence of over 4,000 types in the different orders.

Recent accessions of special value are a collection of European bees, representing all of the genera known except one; the Hubbard material in all orders recently collected in Arizona; the African material collected in Liberia by Cook and Currie; the African and Siamese material collected by Dr. W. L. Abbott; a collection of Coccinellidæ and Psyllidæ made by Albert Koebele in Japan, Australia, China, and Mexico; a collection of parasitic Hymenoptera made by the same collector in the countries above indicated; a very large collection of Japanese insects in all orders presented by the Imperial University of Tokio through Professor Mitsukuri; the T. A. Williams collection of Aphididæ, comprising over 800 slides of forms collected in the Northwest. Smaller donations are constantly being received from collectors and specialists and the number of those received in the course of the year form very important additions to the collection.

The facilities for the preservation of specimens have been very considerably increased, several hundred of the permanent glass-covered drawers having been added.

It is with profound regret that we record the death of Dr. George H. Horn, the eminent Coleopterist, which took place at Beesley's Point, N. J., on the 24th of November last. He was President of the American Entomological Society and Director of the Entomological Section of the Academy of National Sciences of Philadelphia, and one of the few honorary members of the Entomological Society of Ontario.

AN ANTS'-NEST COCCID FROM NEW MEXICO.

BY J. D. TINSLEY, MESILLA PARK, N. M.

Phenacoccus solenopsis, n. sp.

Adult ♀.—Length, 5 mm.; width, 3 mm.; many are smaller than this, but this seems to be the average size of the adult containing eggs. Colour yellowish-gray, although they appear light gray, from the mealy secretion which covers the body.

Shape, ellipsoidal, dorsal surface quite convex, ventral surface flat, extremities rather pointed. Segmentation quite distinct to naked eye. Extremely short lateral appendages, little projections just visible; caudal appendages a little longer.

Legs and antennæ pale brown.

Dorsum has no bands, marks or ridges. Antennæ (fig. 6) of 9 segments; segment 2 longest, one-third longer than 9, which is next; segment 3 next longest and about three-quarters the length of 2; segment 1 usually next, although it is sometimes longer than 3, and sometimes sub-equal with 5; segment 4 is shorter than 5; 5 is usually shorter than 3, but is always appreciably longer than 4, 6, 7, or 8; 6 and 7 usually sub-equal; 8 often sub-equal with 6 and 7, but usually shorter.

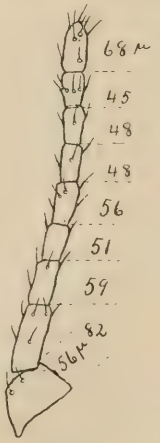

Fig. 6.

Formula 293 (15) 4 (67) 8. Segments of antennæ with moderately stout hairs, segments 1, 4, 6, 7 and 8 having one ring and the others two or more rings of hairs. See figure of antenna.

Legs.—Femur fairly stout, being nearly half as wide as long (width 116 μ, length 282 μ), surface bears numerous bristles; tibia fairly stout (width 42 μ, length 282 μ), equal in length to the femur, bears numerous fairly stout spines; tarsus conical, not quite one-half the length of the tibia (length 105 μ), several spines and a pair of long, slender digitules; claw rather small (length 34 μ), a pair of fairly stout, knobbed digitules.

Anal lobes and ring normal.

Ovisac.—The one ovisac which I have found was on the stem of *Kallstrœmia brachystylis*, Vail., and was about 7 mm. long, 4 mm. wide, and rather loose in texture.

Eggs and newly-hatched larvæ pale yellow; male as yet unknown.

Habitat.—In nests of *Solenopsis geminata*, Fab., about the roots of

Bœrhavia spicata, Choisy, and of *Kallstrœmia brachystylis*, Vail. These plants grow on the sandy mesa, in the atriplex belt, and on digging around their roots one is apt to find a nest of this ant; and on the roots, either just at the surface or up to the depth of an inch below, the Coccids are found. I have also found a few of them on the stems of *K. brachystylis*, which are prostrate. Found October 15th, 1897, on grounds of the N. M. College of Agriculture and Mechanic Arts.

Remarks.—This Coccid would at first thought be taken for *Phenacoccus helianthi*, Ckll., which occurs in the same locality and is found quite abundantly in early spring on a *Phacelia*, sp., but they differ in the following respects: *P. helianthi* has the caudal and lateral filaments quite prominent, and there are well-marked dorsal ridges; all these are absent in this species. In *helianthi*, segments 2 and 3 of the antennæ are usually longer than in this, 2 being about 90 μ, and 3, 80 μ, which is considerably longer than the third in this species; 9 is about the same length in both species. The formula of *helianthi* is 239 45 16 (78). This species is also broader and thicker in proportion to its length.

The ovisac of *helianthi* is also much more compact in texture than in this one. From *P. Americanæ*, King and Ckll., it differs in having the legs and antennæ much larger, and in having ninth joint shorter than either 2 or 3.

This is the first Coccid found associated with ants in New Mexico.

BOOK NOTICE.

Stories of Insect Life.—By Clarence Moores Weed. Ginn & Company, Publishers, Boston, U. S. A., and London; pp. 54, with many illustrations. Price, 25 cents.

The title indicates the nature of the book, and no one will mistake the figure of the well-known "Mourning Cloak" butterfly on the front cover, even though no attempt was made in the way of colour. This is for the young people, and just the thing for boys and girls who are romping and playing over the fields and meadows, securing that most important element in an education, health. The insects treated of are the most common, and this is a great advantage, because it is usually the things that are the nearest to us that we know the least about. Get the children to observe the common things carefully, and they will be all the better prepared to look after the uncommon, later on in life. I only wish that some philanthropist would buy up the whole edition of this work and present them to the school children of the country. Surely it would help to make better men and women of many boys and girls, and open up to them a world of wonders that are to be seen by any, no matter how lowly, provided they only know how and where to look. F. M. W.

Mailed February 4th, 1898.

A RARE ABERRATION OF VANESSA ANTIOPA, ETC.

The Canadian Entomologist.

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A RARE ABERRATION OF VANESSA ANTIOPA.

BY HENRY H. LYMAN, MONTREAL.

In figure 6 of the accompanying plate we have a fair representation of a most interesting aberration of Vanessa Antiopa. This differs from the normal form in the most striking manner, all yellow of the border and the yellow markings on the costa above being replaced by deep brown. Below, the border and the few yellow markings of the normal form are of a very smoky hue, though by no means as dark as above.

It was taken by Mr. C. D'B. Green, at Boundary Creek, B. C., on 23rd August, presumably in 1895. Mr. Green knocked the specimen down with his hat, as he had no net, and it was thus slightly damaged, but is in very good condition considering the manner of its capture. The specimen is a ♀. A somewhat similar aberration is described by Dr. Strecker in his "Butterflies and Moths of North America" as being in his collection as follows: "‡ ab. b. ♀ —With the border on upper side of primaries black instead of yellow," from which I judge that in that case the secondaries were normal. Of course for *black* we should probably read *dark brown*, as I do not believe that any specimen of Antiopa has ever been seen with a really black border.

If this aberration should be found to recur and to become entitled to be considered a variety, I would suggest the name Hippolyta, a queen of the Amazons of whom Antiopa was another queen.

The other figures on the plate are as follows:

No. 1—Brephos Infans, Moeschl., ♂.

No. 2— " " " ♀.

No. 3— " " " blown larva.

These illustrate Mr. T. Dwight Brainerd's paper on the preparatory stages of this species, CAN. ENT., XXIX., 272.

No. 4—Colias Philodice, Scud., ♂, var. Melanic.

No. 5— " " " ♀, " Albinic suffused.

Described by Mr. T. Dwight Brainerd, CAN. ENT., XXVIII., 305.

No. 7—Colias Interior, Scud., ♂, from Cartier, Ont.

No. 8— " " " ♀, " the Adirondacks.

These illustrate my paper on the life history of this species, CAN. ENT., XXIX., 249.

NEW AND LITTLE-KNOWN BEES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Chelynia rubifloris, n. sp.—♀. Eight mm. long, black, with sparse grayish and white pubescence. Head almost as large as thorax, quadrate, produced behind the eyes, cheeks very broad; cheeks, vertex and face very strongly and closely punctured; region of antennæ with some dull white hair; ocelli in a triangle; antennæ rather short, black, last joint compressed, funicle longer than first flagellar joint, first flagellar joint conspicuously longer than second or third; clypeus broad and low, punctured all over, its anterior margin bearing a small tooth at each side, and in the middle a long, narrow projection, like the thoracic spine of some species of *Oxybelus*. Mandibles black, stout, obscurely bidentate at the obliquely truncate ends. Labrum greatly produced, hollowed beneath, sides parallel, end truncate. Tongue very long, linear; maxillæ greatly elongated; penultimate joint of labial palpi broadened at apex, shorter than the last; basal joint not quite half, but more than one-third, length of second; maxillary palpi small, three-jointed, the joints subequal. Thorax rather small, strongly and closely punctured; base of metathorax coarsely wrinkled, bounded by an obtuse rim. Tegulæ black, punctured. Wings smoky, nervures and stigma black, stigma well-formed but small; marginal cell long, with an obtuse apex away from costa; two submarginal cells, second receiving first recurrent nervure at a distance from base nearly equal to length of first transverso-cubital nervure, and second recurrent very near the apex. Legs black, with thin whitish pubescence. Abdomen punctured, with obscure silvery pile towards the end; hind margins of segments with white hair-bands, very broadly interrupted on the first three segments, on the first reduced to lateral patches. Venter with a fairly abundant white scopa.

Hab.—Seattle, Washington State. (T. Kincaid.) Two at flowers of *Rubus ursinus*, May 14.

In describing this extraordinary bee I have given the generic as well as specific characters. Provancher placed his genus *Chelynia* among the Panurgine Andrenidæ, but the insect now described is an Apid allied closely to *Heriades*, and especially to *Ashmeadiella*. This circumstance, and the fact that Provancher's *C. labiata* does not exhibit the remarkable clypeal process, might seem to throw doubt on the generic identification; but the large head, the extraordinary labrum, etc., are all as Provancher describes, and it seems very improbable that he could have had another genus before him.

Ashmeadiella Holtii, n. sp.—♂. Length nearly 6 mm., head and thorax black, abdomen and legs mostly ferruginous. Head nearly as large as thorax, eyes very large ; face about square, covered with snow-white pubescence, as also are the cheeks ; vertex punctured, with thin pale mouse-coloured pubescence ; antennæ short, flagellum dull ferruginous beneath ; mandibles ferruginous, tridentate, the outer tooth long, slender and black. Thorax not very closely punctured, the pubescence white beneath and at the sides, grayish above. Tegulæ amber colour. Wings short, quite clear. Legs ferruginous with white pubescence ; anterior coxæ and femora and middle coxæ and femora more or less blackened. Abdomen punctured, ferruginous; first segment black at base, and dorsal middle of second and third segments suffused with blackish ; no distinct hair-bands, but apex largely clothed with white hair ; apex with four teeth, the median ones somewhat further from each other than from the lateral.

Hab.--College Farm, Mesilla Valley, New Mexico, May 2, 1895. Collected by Mr. Alfred Holt. Allied to *A. bigeloviæ*, but very distinct by the red abdomen.

Halictus olympiæ, n. sp.—♀. Nearly 10 mm. long, black. In structure, colour, the shiny surface, the white patches on the abdomen, etc., this agrees with *H. pectoraloides ;* it differs, however, in being considerably larger, and much broader in every way ; the abdomen is very broad, and the head is transversely oval, with an extremely broad face. The abdomen, including the first segment, is very distinctly punctured. The antennæ are proportionately longer than in *pectoraloides*, and the mesothorax is more closely punctured. The base of the metathorax is covered with quite regular, strong, longitudinal ridges. The tegulæ are shining, piceous, with a brown spot and a pale edge. Wings slightly smoky, nervures and stigma dark brown. Hind spur of hind tibia with numerous short teeth.

Hab.—Olympia, Washington State, June 26, 1896. (T. Kincaid.) Also from Olympia, Mr. Kincaid sends what may be called *H. olympyiæ*, var. *subangustus*. It differs from the type by the narrower and more hairy face, the translucent pale testaceous tegulæ, and the narrower basal enclosure of the metathorax. It is possible that *subangustus* is a distinct species, but I think it is only a variety.

Halictus Kincaidii, n. sp.--♀. About 8 mm. long, black. This is another species of the type of *pectoraloides*, from which it differs thus :

It is more robust, with a broader abdomen ; the wings are quite smoky ; the pubescence of the face and thoracic dorsum are mouse colour ; the face is perceptibly broader ; the tegulæ are piceous and *punctured all over ;* the mesothorax is dull and strongly and closely, though irregularly, punctured ; the enclosure of the metathorax is somewhat more strongly subreticulately wrinkled ; the bases of the abdominal segments are dullish, but there is no well-defined punctuation.

Hab.—Olympia, Washington State, June 13, 1895.

H. similis, Smith, which Mr. Kincaid took at Olympia in May and June, differs from *Kincaidii* at once by its honey-coloured (instead of piceous) stigma, broader head, and impunctate tegulæ. From *H. olympiæ*, *similis* is readily known by the impunctate abdomen, and the hind spur of hind tibia pectinate with four teeth, instead of dentate-serrate. The spur is also pectinate in *Kincaidii*. *H. similis*, it may be remarked, differs from *H. arcuatus* by the impunctate first abdominal segment and the larger second submarginal cell, etc. *H. olympiæ*, v. *subangustus*, is much like *arcuatus*, but is readily known from it by its broader face and dark stigma.

Halictus Lerouxii, var. *ruborum*, n. var.— ♀. Somewhat smaller than usual ; pubescence all strongly tinged orange or yellowish-rufous ; tegulæ reddish-brown (or sometimes quite dark), distinctly punctured along the margin ; tarsi mostly, and hind tibiæ behind, clear ferruginous. Hind spur of hind tibia pectinate with about nine teeth, only the first three large.

Hab.—Seattle, Washington State, May 14, on *Rubus ursinus*. (T. Kincaid.) This looks like a distinct species, but other *Lerouxii* from Seattle are intermediate between it and the type, having the legs dark, but the pubescence and tegulæ of *ruborum*. Some *Lerouxii* from Olympia (Kincaid) are hardly larger than *coriaceus*, but the broad face still distinguishes them.

It may be remarked here that Mr. Kincaid takes at Olympia not only *H. Lerouxii* and *H. coriaceus*, but also *H. sisymbrii*, Ckll., a species hitherto reported only from New Mexico. I have also identified from the Olympia material *H. fasciatus*, Nyl., Rob., and *H. confusus*, Sm., Rob.

Halictoides Tinsleyi, n. sp.— ♀. Six mm. long, black, with rather sparse dirty-white pubescence. Head rather small, facial quadrangle about square, face and cheeks quite hairy ; antennæ very short, wholly dark, flagellum quite thick ; vertex appearing coarsely granular from the

very close punctuation, clypeus with lateral projecting angles; tongue apparently rather short, nearly as in *Hemihalictus*; mesothorax dull and granular from the excessively close punctures; base of metathorax semi-lunar, with fine longitudinal plications or striæ; tegulæ piceous. Wings smoky, iridescent, nervures and stigma black or piceous; stigma rather small, basal nervure noticeably but not abruptly bent; second submarginal cell about as long as the first, receiving the first recurrent nervure at less than one-fourth from its base, and the second (at a right angle) about one-sixth from its tip. Legs black, with whitish hairs; hind legs with a rather abundant scopa, carrying considerable yellow pollen. Abdomen hardly punctured, except that the first segment near its base exhibits large scattered punctures; hind margins of segments pallid; apical half of abdomen pruinose with pale hairs.

Hab.—Five taken by Prof. J. D. Tinsley at flowers of *Gymnolomia multiflora*, in Soledad Canon, Organ Mts., New Mexico, 7,000 feet alt., Sept. 25, 1897. I am not quite sure about the generic position of this little bee. The tongue suggests *Hemihalictus*, but the wings are entirely those of *Halictoides*, and differ from *Hemihalictus*. I sent an example of *H. Tinsleyi* to Mr. W. J. Fox, who kindly compared it with Cresson's types of "*Panurgus*," and writes that it "is apparently different from any here. It is not *fimbriatus*, which has the abdomen much more hairy. It may be the ♀ of *nigrifrons*, but I am inclined to think not." (*Litt.*, Nov. 5, 1897.)

ON THE DIPTEROUS GENUS EUSIPHONA.

BY D. W. COQUILLETT, WASHINGTON, D. C.

At the time of establishing this genus, in my recent revision of the Tachinidæ, I had only two specimens before me; in both of these the wings are bent backward in such a manner as to prevent a critical examination of the lower calypteres, but as the specimens otherwise agree quite closely with the Tachinid genus Gymnophania, I concluded to place the present genus next to it. The recent examination, however, of a perfect specimen from Mr. Charles Robertson, of Carlinville, Illinois, reveals the fact that the lower calypteres are extremely small, being, in fact, rudimentary, and this genus must therefore be transferred from the Tachinidæ to the superfamily Acalyptrata. In all the essential characters it agrees with the family Agromyzidæ, and its proper place is evidently in the vicinity of the genus Desmometopa, from which it will be readily recognized by the strongly convex front and the excessively long, bristle-like proboscis.

SOME INDIANA ACRIDIDÆ.—IV.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

Since the publication of the third paper of this series in the CANADIAN ENTOMOLOGIST for August and September, 1894, my time has been so fully occupied with other duties that but little opportunity has been presented for the collection and study of Indiana Orthoptera. Notes have been made and specimens taken only of such species as came readily to hand during field work in geology. A better knowledge of the distribution over the State of many of the Acrididæ has, however, been gained, and seven species and one variety have been added to the number formerly listed, and to my private collection. Of these, one species and variety have been described as new by Prof. A. P. Morse, a second is described for the first time in the present paper, and a third has before been taken only in Montana and Nebraska.

The publication of McNeill's "Truxalinæ of North America" and of Scudder's "Revision of the Melanopli," especially the latter, has made necessary a number of changes in the synonymy of the species previously accredited to the State. A new list of all Acrididæ mentioned in this and the former papers, with their present nomenclature, is, therefore, appended. It is to be hoped that the papers as published have added something of value to the knowledge of the habits and geographical distribution of this interesting group of insects.

ACRIDIDÆ.

TRUXALINÆ.

1. ORPHULA PELIDNA (Burm).* The Spotted-winged Grasshopper.

Gomphocerus pelidnus Burm., Handbuch II., 1838, 650.
Stenobothrus pelidnus Thos., Syn. Acrid., 1873, 95.
Orphula pelidna Rev. Trux., N. A., 1897, 235.
Stenobothrus maculipennis Scudd., Bost. Jour. Nat. Hist., VII., 1862, 458.
Orphula maculipennis Morse, Psyche, VII., 1896, 326.
Stenobothrus propinquans Scudd., Bost. Journ. Nat. Hist., VII., 1862, 461.

This species has been described or mentioned under the above names by many different persons, and no attempt is made to give a com-

*When the author of a species referred it to a different genus from that to which it is now recognized as belonging, his name is enclosed in a parenthesis.

plete synonymy. That given by McNeill, loc. cit., is faulty and misleading to beginners, in that the name *Gomphocerus* is wrongly used for *Stenobothrus* in a number of the references.

Although it is said to occur in abundance in the United States east of the Rocky Mountains, I did not meet with this species in Indiana during ten years collecting until the 27th of last July, when I found it in abundance about the margins of a small lake in one of the valleys among the sand dunes of Lake County.

It uses both the wings and legs in flight, and when close pressed often burrows into the fallen grass in an attempt to escape detection. Of twenty-one specimens taken but three were females, and they were of the green variety. Five of the males were also partly green, the remainder being brown and fuscous.

2. MECOSTETHUS LINEATUS (Scudder.)

Arcyptera lineata Scudd., Bost. Jour. Nat. Hist., VII., 1862, 462.
Id., Am. Nat., II., 1868, 118. (Song of.)
Id., Proc. Bost. Soc. Nat. Hist., XI., 1868, 8. (Note of set to music.)
Id., Dist. Ins. of N. Hamp., 1874, 373.
Smith, Rep. Conn. Bd. Agri., 1872, 381.
McNeill, Psyche, VI., 1891, 66.

Stethophyma lineata Thos., Syn. Acrid., 1873, 98.
Id., Ninth Rep. St. Entom., Ill., 1880, 104.
Fernald, Orth. N. Eng., 1888, 38.
Bruner, List Neb. Orth., 1893, 23.
Morse, Psyche, VII., 1894, 105.

Mecostethus lineatus Morse, Psyche, VII., 1896, 327, 444, figs. 13–13b.
McNeill, Rev. Trux. N. Am., 1897, 254, figs. 22a, 22b.

The range of this species as given by McNeill is "N. Eng. to N. Ill. and Iowa." He also adds that it is a "rare species, reported but a few times." The above synonymy includes all references to it by American writers. Some of these references, as those of Thomas, Smith, and Fernald, were based on Scudder's writings, the author not having collected it in person. The only definite localities from which it has been recorded are: Norway, Me.; Williamstown and Andover, Mass.; Valley of the Red River of the North, by Scudder; North Haven and

Thompson, Ct., and Readville, Sherburn and Newtonville, Mass., by Morse; and Iowa side of Mississippi, opposite Watertown, Ill., by McNeill. Bruner also reports it as "occurring in the timbered parts of the eastern half of Nebraska," a fact which McNeill seems to have overlooked.

It was noted for the first time in Indiana on July 13th, 1894, when a single male was secured from open ground near the side of a tamarack swamp, just north of Kewanna, Fulton Co. On the following day it was found in small numbers in a boggy meadow between two spurs of another tamarack swamp, just west of Lear's Lake, in the same county. The males were very wild, taking to flight when a person was a dozen yards or more away. They used the wings only in escaping, flying swiftly and noiselessly for 50 to 100 feet and alighting on the stems of tall grass. The only way in which I could effect their capture was by running after them and swooping them with the net as they arose or before they had time to arrange their legs for the upward impetus at the beginning of a new flight. But two females were seen. They were much darker and more bulky and lubberly than the males, and being in a more open place, where the grass was shorter, were easily taken. The species probably occurs in the vicinity of tamarack swamps and peat bogs throughout the northern half of Indiana, though it was not noted about several which have been visited in the last three years.

OEDIPODINÆ.

3. PSINIDIA FENESTRALIS (Serville.) The Long-horned Grasshopper.

Oedipoda fenestralis Serv., Hist. Nat. des Orth., 1839, 726.
Thos., Syn. Acrid., 1873, 118.
Locusta fenestralis Harris, Ins. Inj. Veg., 1862, 177.
Psinidia fenestralis Stal., Recens. Orth., I., 1873.
Sauss., Prod. Oedipod., 1884, 161.
Fern., Orth. N. Eng., 1888, 44.
Beut., Bull. Am. Mus. Nat. Hist., VI., 1894, 303, Pl. VIII.
Morse, Psyche, VIII., 1897, 111, fig. 28.
Locusta eucerata Harris, Ins. Inj. Veg., 1862, 180.
Oedipoda eucerata Scudd., Bost. Journ. Nat. Hist., VII., 1862, 472.

This handsome little Acridian has been mentioned by numerous other writers under the names given above, but it is not thought best to give the full synonymy in this connection. The species evidently occurs

from the Atlantic to the Rocky Mountains, wherever there are extensive sand-covered areas, having been reported from Colorado and Canon Cities, by Uhler; from north-west Nebraska, by Bruner; from Illinois, by McNeill; and from various points on the Atlantic coast between Maine and Louisiana, by Harris, Scudder, Smith, Morse, and others.

In Indiana, it has been noted only in Lake and Porter counties in the sandy area bordering Lake Michigan, where it was first taken July 27, 1897. It is most common along the beach within one-half mile of the lake, in company with *Trimerotropis maritima* (Harris) and *Spharagemon wyomingensis* (Thos.), though a few specimens were taken on sandy ridges five miles from the lake shore. It has a quick, short flight, and always chooses a bare, sandy spot on which to alight. Unless it is carefully "marked down" it is then very difficult to distinguish, since its colours harmonize so perfectly with its surroundings. By keeping an eye on it, and stealthily approaching, it can be readily taken by throwing the net quickly over it just as it is in the act of rising. The male makes a slight rattling sound as it flies, but the movement of the female is noiseless. The majority of the specimens seen had the inner wings a bright red at base, though variations in colour, from light yellow to deep red, were frequent.

ACRIDINÆ.

4. MELANOPLUS EXTREMUS (Walker.)

Caloptenus extremus Walker, Cat. Dermap. Salt., IV., 1870, 681.
Melanoplus extremus Scudd., Proc. U. S. Nat. Mus., XX., 1897, 287, Pl. XVIII., fig. 10.
Pezotettix junius Dodge, Can. Ent., VIII., 1876, 9.
Melanoplus junius Scudd., Proc. Bost. Soc. Nat. Hist., XIX, 1878, 286.
Caloptenus junius Scudd., Can. Ent., XX., 1880, 75.
Caloptenus parvus Provancher, Nat. Canad., VIII., 1876, 110.

This species has also an extensive synonymy, the above being but a small portion, showing the names under which it has heretofore been known. It is an insect of northern range, Walker's type being recorded from Arctic America. According to Scudder "it probably occurs throughout the larger part of Canada and the northernmost United States. It has also been recorded from several points in Alaska."

Mr. C. H. Bollman evidently found it near Bloomington, Monroe County, Indiana, since Scudder mentions a specimen so labeled as

occurring in the U. S. Nat. Museum. It first came to my notice in the State on August 8, 1897, when it was found near DeLong, Fulton County, in an open peat bog which was surrounded on all sides by a heavy growth of tamarack, *Larix americana* Michx. But about a dozen specimens were secured, all of which were of the short-winged form, *M. e. junius*, the measurements of male being: length of body, 18 mm.; of tegmina, 11 mm.; of hind femora, 11.5 mm.

When disturbed they gave several short, quick leaps, and then burrowed as far as they could into the dense mass of sphagnum moss which everywhere covered the bog.

5. MELANOPLUS ANGUSTIPENNIS (Dodge.) The Narrow-winged Grasshopper.

Caloptenus angustipennis Dodge, Can. Ent., IX., 1877, 111.
Thos., Rep. U. S. Ent. Comm., I., 1878, 43.

Melanoplus angustipennis Bruner, Bull. Wash. Coll. Lab. Nat. Hist., I., 1885, 138.
Id., Bull. 28, U. S. Div. Ent., 1893, 24, fig. 12.
Scudd., Proc. U. S. Nat. Mus., XX., 1897, 305, Pl. XX., fig. 6.

This is a western species which has not heretofore been recorded east of Kansas and Iowa. According to Bruner, it ranges from North Dakota to Texas, and west to Yellowstone, Montana. He also states that it is increasing rapidly in numbers, and is likely in places to become a serious pest.

It is one of the most common grasshoppers about the south shore of Lake Michigan, occurring in company with *M. atlanis* (Riley), *Spharagemon wyomingensis* (Thos.), and others over a large part of the sandy area within five miles of the lake. It seems to prefer such barren localities to those more promising in plant food, since Bruner mentions its partiality for "old breakings and well-fed pastures of many years' use."

To a cursory observer *angustipennis* bears a general resemblance to *atlanis* (Riley), but may be readily distinguished by its blue tibiæ, the lack of a notch at the apex of the last abdominal segment of the male, and the different shape of the male cerci. The dark spots along the middle line of the tegmina of the Indiana specimens are larger and more numerous than one would expect to find after reading the descriptions of Dodge

and Scudder. Its habits, moreover, are not arboreal, as observed by Bruner, since it was more often found on the ground than on the scant vegetation growing in the area which it inhabited.

6. Paroxya Scudderi sp. nov.

The smallest known member of the genus, the body of the male averaging but 17 mm. in length. Antennæ relatively short, 9.5 mm. in both sexes. Tegmina reaching slightly beyond tip of abdomen in male, shorter than abdomen in female.

Male with posterior lobe of pronotum, tegmina, and upper and outer faces of all the femora a uniform light wood brown; occiput and anterior lobes of pronotal disc darker. A broad black stripe extends from eye along the upper half of the lateral lobes of pronotum as far as the posterior transverse sulcus, where it ends abruptly, the posterior lateral lobe being uniform in colour with the disc. Below this black stripe is one of ivory white, brightest on the head. Metapleurite also ivory white. Face grayish olive, flecked or tinged with yellowish. Proximal two-thirds of antennæ the colour of the tegmina; distal third darker. Palpi and prosternal spine yellow. Sternites of thorax olive brown; those of abdomen yellow, as also the lower face of all the femora. Hind tibiæ pale glaucous (the proximal third sometimes light brown), with a black spot at geniculation; the spines eleven in number in the outer series, with their distal thirds black.

Female darker; the tegmina sometimes obscurely and sparingly flecked with fuscous, covering three-fourths or more of the abdomen; the yellow of under side dull or wanting.

Supra-anal plate of male very short, triangular, with a short, basal, triangular sulcus, in which rest the furcula. These consist of a pair of flattish, oblong, subequal plates with their inner edges attingent except at the apices, where they slightly diverge. Cerci strongly incurved, narrowed at the middle, the proximal half stouter than in *P. hoosieri*, the distal third flattened and rounded apically.

Average measurements: Length of body, male 17 mm., female 24 mm.; antennæ, male and female, 9 mm.; tegmina, male 13 mm., female 14.5 mm.; hind femora, male 11.5 mm., female 13.5 mm. Five males, 4 females.

This graceful-bodied species was found in small numbers on July 27, 1897, about the grassy margins of a pond in the sand dune region

north of Miller's, Lake County, Indiana, and within one-half mile of the shore of Lake Michigan. On the following day a single pair were taken from a similar locality near Tolleston, in the same county, and about four miles from the lake, but still within the sand-covered area. It was usually found clinging to the stems of the tall rushes and grasses common in such locations, and when disturbed the males used the wings in a noiseless flight, while the females depended upon their leaping powers to escape. When closely followed, they would attempt to hide by burrowing in the fallen grass.

The form is more closely allied to *P. atlantica* Scudder, than to either of the other two known species of the genus, but its smaller size, longer cerci, and the different shape of the male furcula at once distinguish it. I take pleasure in naming it in honour of Mr. S. H. Scudder, who in the past has rendered me much aid in my study of Acrididæ, and who has done far more than any other man towards putting the study of North American Orthoptera on a substantial basis.

TETTIGINÆ.

7. TETTIGIDEA ARMATA Morse.

Tettigidea armata Morse, Journ. N. Y. Ent. Soc., III., 1895, 107.

This species was described from specimens collected by me in Vigo County. It was formerly confounded with *T. lateralis* Say, but is distinguished by having the anterior margin of the pronotum produced in a sharply pointed cusp, instead of being rounded or obtusely angulate, and in having the dorsum of pronotum strongly rugulose, with the median carina sharp and distinct. One pair, *in coitu*, were taken June 20, 1894, from the wooded margin of a large pond in the lowlands of the Wabash River. It has also been taken about the margin of a lake near Waterloo, DeKalb County, and, according to Morse, near Dallas, Texas.

7a. TETTIGIDEA ARMATA DEPRESSA Morse.

T. armata depressa Morse, *loc. cit.*, 107.

This differs from the above in that the pronotum only reaches the tip of the hind femora instead of much surpassing them. A single female in my collection from Vigo County served as one of Morse's types, the others being from Florida and Louisiana. According to Hancock (Trans. Am. Ent. Soc., XXIII., 1896, 242), *Tettigidea acuta* Morse, occurs at Chicago and Riverside, Illinois. It is therefore, doubtless, a resident of Indiana.

* * *

Notes on Some of the Species Mentioned in the Previous Papers.

Truxalis brevicornis (L.) (C. E., XXIII., 75; XXVI., 221.)

This well-marked species occurs sparingly about the borders of marshes in Lake County, so that its range includes the whole State.

Chlœaltis conspersa Harris. (C. E., XXIII., 75; XXVI., 222.)

The males of this species, which before had been rarely met with, were found in numbers in low, rather dry woods along the borders of streams in Montgomery County, in July, 1895. A female was taken at dusk on the evening of July 21, in the act of ovipositing in the end of a partly decayed oak log. Three eggs were found in the bottom of the cavity in which the abdomen was inserted.

Hippiscus tuberculatus (Pal. d. Beauv.) (C. E., XXIII., 81.)

This is the *H. phœnicoptera* of my first paper. In Indiana it has been found only in the driftless limestone area of the southern half of the State, being especially common in Monroe and Franklin counties. Adults have been taken as early as April 20th, and as late as August 15th. It frequents timothy meadows, upland pastures, and roadsides, and when in flight is very conspicuous owing to its large size and bright red inner wings. In suitable localities, the young of this species, as well as those of *Arphia sulphurea* (Fab.) and *Chortophaga viridifasciata* (DeGeer) are, on bright days in midwinter, often to be seen together in numbers jumping vigorously about. If their presence at such a season comes to the attention of a newspaper reporter, the press of the entire State is apt to teem with notices of a coming grasshopper plague, of which the youngsters are said to be the advance guard.

Spharagemon wyomingensis (Thos.) (C. E., XXXVI., 218.)

The *Spharagemon oculatum* Morse, of my third paper has since been determined by Prof. Morse to be identical with the species described by Thomas under the above name. It occurs in sandy localities in the northern part of Indiana, being especially common in the immediate vicinity of Lake Michigan. It reaches maturity about July 10th, and may be taken until mid-October.

Trimerotropis maritima (Harris.) (C. E., XXVI., 218.)

Since my former mention of this species it has been found to be very common along the south shore of Lake Michigan, in Lake, Porter, and

LaPorte counties. It flies rapidly for long distances, and unless carefully marked down, is very difficult to detect. It varies in colour from very light gray to a dark gray mottled with brown; the darker specimens being found at some distance from the lake, where there was a scattering vegetation, the light-coloured ones on the pure sand of the immediate shore. It was seen nowhere more than a half mile back from the water margin, and then only on the bare crests of the highest sand ridges and dunes.

MELANOPLUS OBOVATIPENNIS (Blatchley.) (C.E., XXIII., 80; XXVI., 241.)

In Scudder's recent monograph of the Melanopli, this species is transferred from *Pezotettix* to *Melanoplus*. It has been recently found in Marion, Franklin, and Crawford counties, and therefore probably occurs in high, dry woodlands over the southern part of the State. It is also recorded by Scudder, from Kentucky, Missouri, and near Dallas, Texas.

MELANOPLUS BLATCHLEYI Scudder. (C. E., XXIII., 81; XXVI., 243.)

This is the species formerly known as *Pezotettix occidentalis* Bruner. In Scudder's revision it was also transferred to the genus *Melanoplus*, in which the name *occidentalis* was preoccupied.

It is found from June 15th to November 1st, in open woods. On October 25th, 1897, two specimens were taken in Marion County, from the side of a hackberry tree, *Celtis occidentalis* L. This is the most eastern point at which it has been noted in the State.

MELANOPLUS DIFFERENTIALIS (Uhler.) (C. E., XXIII., 99.)

The general range of this species is southern, but specimens have been taken in Lake County, in the extreme north-western part of the State. It is very common in the Wabash valley.

MELANOPLUS PUNCTULATUS (Uhler.) (C. E., XXIV., 30; XXVI., 245.)

This is the *M. griseus* Thos., of my former papers, Scudder having determined that to be a synonym of Uhler's species.

It has proven to be of more general distribution over the State than at first supposed, having been taken in Vigo, Putnam, Montgomery, Fulton, and Marion counties. With the exception of those formerly noted as found in the tamarack swamp in Fulton County, where it was frequent, but one or two specimens have been taken each season, and they in damp localities in late autumn. On October 25, 1897, two specimens were

secured from the trunks of trees in a low, dense woods in Marion County. They were about four feet from the ground, and one of them was beneath a chunk which was leaning against the tree.

PAROXYA HOOSIERI (Blatchley.) (C. E., XXIV., 31 ; XXVI., 244.)

On account of distinctive characters pertaining to the abdominal appendages of the male, Scudder regards this as a valid species. It has been taken about swamps in Vigo, Fulton, and Marshall counties, Indiana, and near Oberlin, Ohio. On September 22, 1894, I was much surprised to find, near the border of a marsh in Vigo County, a female of this species and also one of *Chlœaltis conspersa* Harr., a few inches apart on the stump of a downy poplar, *Populus heterophylla* L., each with the abdomen buried to the full length in the wood, but no eggs could be discovered. Nothing has been recorded concerning the habits of oviposition of the members of the genus *Paroxya*, and it would be surprising if they, like the *Chlœaltis* mentioned, should seek wood rather than earth as the receptive matrix for the eggs.

A REVISED LIST OF THE ACRIDIDÆ KNOWN TO OCCUR IN INDIANA.

ACRIDIDÆ.

TRUXALINÆ.

1. *Truxalis brevicornis* (Linn.) Short-horned Grasshopper.
2. *Syrbula admirabilis* (Uhler.) Handsome Grasshopper.
3. *Chlœaltis conspersa* Harris. Sprinkled Grasshopper.
4. *Dicromorpha viridis* (Scudder.) Short-winged Green Grasshopper.
5. *Orphula pelidna* (Burm.) Spotted-winged Grasshopper.
6. *Mecostethus lineatus* (Scudder.)
7. *Stenobothrus curtipennis* (Harris.) Short-winged Brown Grasshopper.
8. *Ageneotettix scudderi* (Bruner.)

OEDIPODINÆ.

9. *Arphia xanthoptera* (Burm.)
10. *Arphia sulphurea* (Fab.) Yellow-winged Grasshopper.
11. *Chortophaga viridifasciata* (DeGeer.) Green-striped Grasshopper.
12. *Encoptolophus sordidus* (Burm.) Clouded Grasshopper.
13. *Hippiscus tuberculatus* (Pal. de Beauv.) Coral-winged Grasshopper.
14. *Hippiscus rugosus* (Scudder.) Clumsy Grasshopper.
15. *Dissosteira carolina* (Linn.) Quaker or Black-wigned Grasshopper.
16. *Spharagemon bolli* Scudder.
17. *Spharagemon wyomingensis* (Thomas.)

18. *Psinidia fenestralis* (Serville.) Long-horned Grasshopper.
19. *Trimerotropis maritima* (Harris.) Maritime Grasshopper.

ACRIDINÆ.

20. *Leptysma marginicollis* (Serville.) Slender-bodied Grasshopper.
21. *Schistocerca americana* (Drury.) American Grasshopper.
22. *Schistocerca alutaceum* (Harris.) Leather-coloured Grasshopper.
23. *Melanoplus atlanis* (Riley.) Lesser Grasshopper.
24. *Melanoplus scudderi* (Uhler.) Scudder's Short-winged Grasshopper.
25. *Melanoplus viridipes* Scudder. Green-legged Grasshopper.
26. *Melanoplus obovatipennis* (Blatchley.) Obovate-winged Grasshopper.
27. *Melanoplus femur-rubrum* (DeGeer.) Red-legged Grasshopper.
28. *Melanoplus extremus* (Walker.)
29. *Melanoplus angustipennis* (Dodge.) Narrow-winged Grasshopper.
30. *Melanoplus blatchleyi* Scudder.
31. *Melanoplus gracilis* (Bruner.) Graceful Grasshopper.
32. *Melanoplus minor* (Scudder.)
33. *Melanoplus collinus* Scudder.
34. *Melanoplus differentialis* (Uhler.) Lubberly Grasshopper.
35. *Melanoplus bivittatus* (Say.) Yellow-striped Grasshopper.
36. *Melanoplus punctulatus* (Uhler.) Mottled Grasshopper.
37. *Paroxya hoosieri* (Blatchley.) Hoosier Grasshopper.
38. *Paroxya scudderi* Blatchley.

TETTIGINÆ.

39. *Nomotettix cristatus* (Harris.) Crested Grouse Grasshopper.
39a. *Nomotettix cristatus carinatus* (Scudder.)
40. *Tettix ornatus* (Say.) Spotted Grouse Grasshopper.
40a. *Tettix ornatus triangularis* Scudder.
41. *Tettix granulatus* (Kirby.) Sprinkled Grouse Grasshopper.
42. *Tettix arenosus* Burm. Grizzly Grouse Grasshopper.
43. *Paratettix cucullatus* (Burm.) Hooded Grouse Grasshopper.
44. *Tettigidea lateralis* (Say.) Black-sided Grouse Grasshopper.
45. *Tettigidea parvipennis* (Harris.) Small-winged Grouse Grasshopper.
45a. *Tettigidea parvipennis pennata* Morse.
46. *Tettigidea polymorpha* (Burm.)
47. *Tettigidea armata* Morse.
47a. *Tettigidea armata depressa* Morse.

NOTES ON COLLECTING "AT LIGHT."

BY A. W. HANHAM, WINNIPEG, MAN.

(Continued from page 36.)

July 23rd: Lots of things at light, but mostly common species already recorded. A fresh Peridroma occulta was taken, and more Plusia striatella and Deva purpurigera.

July 24th: This was an evening for the Ichthyura, over a dozen being captured, also some Schizura. Dryopteris rosea was still out, and several fresh Mamestra purpurissata came in. The absence of Plusias and the abundance of "snout" moths is noted in my diary. The Coleoptera were strongly represented by a large Necrophorus.

July 25th: A Catocala briseis — the first Catocala of the season — made things lively until it found its way into one of my bottles. Plusias reappeared, and Noctua plecta increased my local list. A large number of nice things in "Micros" were attracted and secured.

July 27th: This was the last evening that I record any abundance of things at light, and the following deserve mention: Pheosia dimidiata (1), Crambidia pallida (sev.), Orgyia leucostigma (sev.), Parorgyia plagiata (sev.), Ichthyura vau (6), Arctia Saundersii (3), Acronycta impressa (sev.), Noctua collaris (sev.), Carneades flavicollis (sev.), Rhynchagrotis alternata (sev.), Homohadena badistriga (1; two or three of this striking-looking species were taken earlier in the month), Mamestra nimbosa (2), Plusia æreoides and bimaculata were still showing themselves, and Hadena niveivenosa and Mamestra meditata were common. Tricholita semiaperta, of which I secured several, added a handsome species to my collection, and a fresh lot of Phasiane mellistrigata were taken, apparently a second brood.

August 4th: A pair of Catocala briseis and a fine Plusia balluca showed up among the things captured this evening; a second specimen of the latter visited me, but after a flying inspection of my quarters, wandered outside and was no more seen.

August 31st: After an absence from the city of three weeks I once more started my light trap. My catch included a dozen or so "Micros" (some desirable), a new Geometer (carpet), and the following species of Noctuidæ: Rhynchagrotis placida, Agrotis saucia and ypsilon, Noctua fennica (very worn), Feltia venerabilis (sev.), Carneades tessellata, Anytus sculptus (a beauty), Hadena mactata, Hillia algens (several nice examples), Nephelodes minians (worn), Hydræcia nictitans, Caradrina extimia, Nonagria sp. (1, not yet named), Cosmia infumata (sev.), Orthosia

ferruginoides and euroa, Xanthia togata, Cirrœdia pampina, Litholomia napæa (some beauties), Lithomia germana, and Calocampa nupera, cineritia and curvimacula.

Sept. 1st: I commenced the month by adding three species to my collection: Carneades velleripennis (a pair), Hydræcia obliqua (1) and Xylina capax (a pair). A specimen of Plusia Putnami gave me a surprise; it was very fresh, but small.

Sept. 16th: Besides some common species, I noted this evening the capture of Glæa inulta, Hydræcia sera, Xanthia togata, Litholomia napæa, and Xylina Georgii and laticinerea. Hadena devastatrix and Drasteria erechtea turned up again, very fresh specimens.

My last records are:

Sept. 21st: Hydræcia cerina (1; new to list).

Sept. 23rd: A very small specimen of Agrotis saucia, and a worn Feltia subgothica.

Sept. 24th: Orgyia leucostigma and Leucania juncicola (one each).

Some evenings early in the month water beetles, and especially a small water "bug," were abundant at light. I generally used an ordinary lamp with a good-sized burner; sometimes a "Wanzer" lamp, and on a few occasions I had the two lit at the same time; both lamps had shades. The trouble with the "Wanzer" was that things often got into the flame, and now and then succeeded in putting it out, or making it smoke badly. My custom was towards dusk to light the lamp and put it on the edge of a table close to the window—which I had wide open—leaving a little space between the tablecloth and the window sill; (lots of things flew or dropped down on the floor which would otherwise have sneaked out of the window). I tried the window sill for the lamp, but found there was often too much wind for it there, and on rainy nights that position was out of the question. The house being a new one, the walls of my room are not papered, so that the moths when they rested there were very conspicuous, and it was possible to tell at a glance, in most cases, what they were; whether Bombyces, Plusias, Geometers, etc., and to select the most desirable first.

I used a net as seldom as possible, for fear of overturning the lamp, and also because—I think it was on the second evening of my venture—I caught the end of a setting-board with my net, and sent it flying from a high shelf to the floor, to the destruction of its contents and the loss of my temper. It was only sometimes for the Sphingidæ that I found a net was necessary. Besides two large glass bottles or jars (charged with cyanide,

of course), I had three or four small ones in use, with which I did most of the capturing, bottling from off the lamp shade, the table, walls, etc. It was often necessary to put these bottles over some good thing sitting on the floor, the window sill, or the shelves of my bookcase, and to have that number in constant use. As soon as the specimen covered or bottled was quiet, it was transferred to one of the large bottles, and the small one was ready for use again. I found it desirable to take up my carpet, owing to the quantity of insects that came in in July, and which littered the floor; often trodden under foot during the evening (some good things came to grief in this way), or succumbing to the dry heat of the room during the night or following day. I had to make "sweeps" of the slain occasionally, they made such a mess; an examination of the dustpan before consignment of its contents to the fire, sometimes revealed some specimen worth keeping; it was in this way that I secured two out of the four specimens taken of Tapinostola variana. On some evenings I think all the mosquitoes of the neighbourhood found their way in at my window, and assisted in making things lively for me; and the number of things flying about the room, or dashing around the lamp, was quite bewildering, and not conducive to coolness. Besides these pests (the mosquitoes) several species of Ichneumonidæ put in an appearance, on some evenings in numbers; and while they did not seem to be attracted to the lamp particularly, they kept on the move about the room, making considerable noise on the walls and ceiling. Perhaps the worst visitors of all were some of the large Dytiscidæ and Lachnosterna fusca. In September several kinds of water-flies came to the light in numbers.

Some peculiarities of this mode of collecting were noticed, and may be worth mentioning. One thing I observed particularly, when I put in a good long evening at it, was the occasional lull, of greater or lesser duration, when hardly anything seemed to be moving outside, judging by the scarcity of things coming in; then all of a sudden a fresh lot, of all kinds and conditions, would come swarming about the lamp. Some nights there would be a succession of the same species, one after the other, for a short time, as if they had been playing at "Follow my leader," and then not another would be seen that night. Again, a species would come in one evening in fair numbers, and then never show up again; others just one or two only in the same way. Two most striking examples of the latter were Ianassa lignicolor and Noctua plecta; in both cases three specimens were taken within a few minutes, and no others were seen on that or other evenings. Other species, again, appeared to occur in about

the same numbers on favourable or poor nights, and in some cases were on the wing for nearly a month. Some nights nothing was moving until much later than usual, and I had been on the point of "closing up" for the evening—my patience being exhausted—when some things would come along amply repaying me for the previous barrenness. There was quite a difference, too, in the way in which the light appeared to affect different species; some would dash around the lamp until they got their wings singed; others would fly in and sit down quietly on the table, as if inviting capture; some seemed only anxious to get out of the glare, and would settle quietly on the floor or the hanging tablecloth; some (chiefly Noctuids) could not make themselves scarce quickly enough, which they did by getting behind the cases, books, or on my shelves, and staying there; others were very restless and kept on the move until captured. In some few cases it appeared as if my visitors had but looked in to make an inspection, for after a turn or two about the room or lamp, they beat a retreat in a very businesslike manner; but I also noticed that some things which came dashing in, when they retraced their steps (?) did so with a very sober or hesitating flight, as if not sure of their way. As a rule, the Bombycidæ, Plusiæ, and Geometridæ behaved very well, not being very wild, and they soon sought resting places on the walls, etc., seldom attempting to secrete themselves.

Besides the moths taken at light on the evening in which they came into my room, I usually had another good catch the following morning, and took more specimens again about dusk the next evening. On quitting work, or rather pleasure, for the evening, I would first close my window, leaving the blind half up, then put out the light and retire, carefully shutting the door. In the morning nearly everything in the way of "Micros," Geometers and Bombyces—also any Plusias overlooked the previous evening—would be found congregated on and about the window, on the blind or table cloth. (On July 2nd one of my captures in this way was a beautiful thing, and the only one seen, Dasyspoudæa Meadii.) The Noctuids generally appropriated the holes and corners, but the majority of them did not show themselves in the morning. After picking and choosing what I wanted, I opened the window and freed the rest. I put on the fly blind to ventilate the room, keep out the flies, and keep in any moths still there. Towards dusk the Noctuids, which had hidden themselves during the daylight, would come from their retreats and they were easily bottled off the window or fly blind, where they gathered.

Sometimes I would get quite a number and variety from behind coats, etc., hanging on my door; a shake would often disturb half a dozen moths from the same garment.

After the Bombycidæ, my greatest success was with the Plusias. I am not certain whether more æreoides came to light than striatella. I did not bother much about the former; but my records of the latter show the taking of sixty specimens, of which nearly fifty were perfect. It was on the wing for about a month. The next in abundance was Putnami, and ampla was fairly common for about a week. Only one simplex came to light.

A few more observations, and I have done.

There is no doubt that, owing to the heavy rainfall during July, unusual for this climate, I had a much larger percentage of good or suitable evenings than would be the case in average years.

Another circumstance, perhaps accounting for the abundance of moths about during July, may have been the unusually heavy snowfall of the previous winter. The snow came at the end of October; during November it may be said to have snowed, more or less, every day, and there were no thaws to speak of during the winter to expose or uncover the earth. In the spring the snow disappeared very quickly, its departure being hastened by some heavy rains.

The weather during April and the early part of May was favourable to the development of vegetation and insect life. The end of May and the beginning of June, however, were on the cool side, and there were frosts on several nights. I hope, for the sake of comparison, that I may have the chance to collect here "at light" again next season.

SOME INSECTS, RARE IN CANADA, TAKEN AT HAMILTON BY MR. JAMES JOHNSTON.

Having some correspondence with Mr. Johnston, he, anticipating the interest I naturally felt in the entomology of my former residence, informed me of some things he had taken at Hamilton which were not to be got when I was a collector there; and they seemed to me to be of so much general interest that I desired him to make a note of them for publication. So, complying with my request, he has prepared the accompanying more extended statement on the subject. What a rapid change is taking place in the condition of the country! All my familiar and delightful hunting-grounds in that locality have been "improved out of existence." With cultivation comes a change in the flora, which produces

a change in the fauna, and in the insect fauna especially. So that future collectors will be able to form no correct idea of what was to be got by what is to be had. A thought that greatly impressed me was the persistent effort that insects are continually making to spread abroad and establish themselves in fresh territory. Most of these southern butterflies seem to have great difficulty in accommodating themselves to our shorter seasons. In the case of *Colias cæsonia* there should be no trouble about food plants, as one of these is *Trifolium;* but in the south-west it is double-brooded, and it may perish in the attempt to produce a second brood in this latitude, and it may take many years to bring it into harmony with its environment here.

In his catalogue of 1877, Mr. W. H. Edwards gives its habitat as Southern States, Mississippi Valley, Kansas, Texas, Arizona. And in 1888, CAN. ENT., Vol. XX., page 23, he says: "*Cæsonia* is a common butterfly in the Mississippi Valley and Gulf States; also in Southern California, and to the Isthmus." Then he adds: "I myself have never seen it on the wing." What an extent of territory it must have covered in the last ten years! It would be interesting to know the routes it has taken. The first Canadian examples of it that I saw were taken at Long Point, Lake Erie, twenty years ago or so. I also have not yet seen it on the wing.

The locality where I took my *Pamphila dion* was in a marsh at the west end of the city. The Rifle Club had its ranges on a piece of waste land there; and for convenience to reach the butts had constructed a board walk through an arm of the marsh, which was full of water and covered with cat-tail flags. Two clumps of a large flowering plant grew beside that board walk; the butterflies and the blossoms appeared together about the 1st of July, and from these blossoms I took all my *P. dion.* When the Rifle Range was moved to another locality that board walk was abolished, and from that time on I got no more specimens of *dion.* I was pleased to learn that Mr. Johnston had rediscovered it. I have not heard of its being taken anywhere else in Canada. I had been taking it for several years before I got its name. Specimens of it were given to the Canadian collection that went to the Centennial Exhibition at Philadelphia, and a promise made that its name should be procured. I got tired waiting, and sent specimens of it to Mr. W. H. Edwards, to find that it had been named only a few months previously from material obtained elsewhere. (CAN. ENT., Vol. XI., p. 238.)

Saperda candida had not been seen about Hamilton in my time.

J. ALSTON MOFFAT.

During the years of my collecting, 1896 leads in presenting rare

insects to this locality. Besides some Coleoptera and Lepidoptera not yet satisfactorily determined, the following species were taken :

COLEOPTERA.

Saperda concolor, Lec.—Several dozen last week in May and first in June. On Swamp Willow.

Saperda candida, Fab.—Thirty specimens, June 4th and some days later. Found on Thorn when hunting for *S. Fayi.*

DIURNALS.

Nisoniades propertius, Scud.—One, May 26th. On roadside. Differs only from one labeled British Columbia in my collection by being a finer specimen.

Papilio marcellus, Cram.—One June 4th, and one before and after that date. On Clover.

Libythea Bachmani, Kirt —One, June 4th. Saw another later on. On Poison Ivy.

Colias cæsonia, Stoll.—Twelve good and several poor specimens. First taken June 14th. Quite abundant until the end of the month. First saw it June 7th, but finding it very wild did not succeed in capturing a specimen until the 14th, when I took six. Last taken July 1st. Was most abundant on line of Grand Trunk Railway, between Hamilton and Stony Creek. Saw it on Toronto branch of same railway near Waterdown when out after *Phyciodes Batesii*, Reak., June 20th, but not so abundant.

Pamphila dion, Ed.—Seven, July 1st and following week. I have found this species not so fond of feeding as other Pamphilas. It seems to like to sit resting on the coarse swamp grass in damp places along the railway.

Satyrus alope, F.—One, fine, July 9th. On side of railway track, amongst weeds.

Junonia cœnia, Hub.—One, August 27th. Almost dead on roadside.

MOTHS.

Sphinx luscitiosa, Clem.—One, May 28th. Just fully matured, hanging to a weed near railway track.

Endropia serrata, Drury.—Five, July 15th. Amongst weeds on side of railway track.

I was in hopes of at least some of these reappearing in 1897, but in this I was disappointed, as not one of them was seen.

I did not do much hunting outside the farm on which I live, four

miles east from Hamilton, this year. Amongst the greatest pests that we had to contend with were the potato beetles (*Doryphora 10-lineata*, Say). Out of 8,000 tomato plants set out during the first week in June, fully 2,000 were destroyed by these beetles within four days. We came across some plants having as many as eighteen beetles on them. We have not hitherto been annoyed by their attacking our tomato plants to a very great extent, and can only account for their ravages this season owing to a slim crop of early potatoes in this neighborhood, the late ones not yet being above ground.

The Tomato Moth grubs (*Sphinx quinquemaculata*) were also very abundant and could have been had by the hundred. It appears that they have other enemies than Ichneumons, as I came across dozens of empty chrysalids, when picking the fruit in September, which had been rooted out and devoured by some animals, possibly skunks, certainly not mice, judging from the excrement lying about.

Terias lisa, Bd.—One, July 4th. The only rarity taken this season.

James Johnston, Hamilton, Ont.

THE LABELING OF ENTOMOLOGICAL SPECIMENS.

BY CHARLES STEVENSON, MONTREAL.

During a visit to Great Britain a few years ago I looked over a number of the Entomological collections in the public Museums there. The specimens in them were labeled so as to show the order, sub-order, and family that they belonged to and their individual scientific names. With few exceptions there were no records of their geographical distribution, and when information of habitation was given it was of a wide nature, as North America, Asia, or Europe. Data of seasonal appearance or date of capture were entirely absent. Since then I have found that many collections on this side of the Atlantic are in the same condition, and private collections in particular. That such information should be wanting, especially in a public collection, is to be regretted; for however beautifully mounted, classified and correctly named the specimens may be, they are of little practical value. The biological student gets no more information than he would from any entomological publication containing plates, unless it be the identification of some rare insect. The reason that public collections are lacking in such data is because they have been built up from donations or by purchase — and until recent years the study of insects rarely consisted of more than collecting, mount-

ing, naming, and placing in classified order. This can be remedied by the present-day collector, professional or amateur. It seems strange that a method of labeling similar to what I shall illustrate has not become more general. On hunting up bibliographic references on the subject in my own library I found little instruction. In *The Entomologist's Useful Companion, by Geo. Samouelle, London, 1819*, the author directs that each specimen shall have a number corresponding with that of a catalogue having an account of the place where found, time of appearance, etc. The *Report of the Commissioner of Agriculture, U.S.A., for 1868*, contained an article on *Practical Entomology for Farmers' Sons*, recommending the same method, with the improvement of having the numbers on coloured disks; the different States or localities being represented by a certain colour. These methods are unsatisfactory, as they show nothing without the catalogue, and when a collection leaves the original owner's possession it is often divided up, and the catalogue is lost sight of. It is surprising that among the many handbooks and guides published there is so little mentioned on this subject. Even that indispensable work, *Entomology for Beginners, by A. S. Packard, M. D., Ph. D., New York, 1890*, recommends only the coloured number disks. The most satisfactory directions are those of Samuel H. Scudder in his *Butterflies, their Structure, Changes and Life Histories, New York, 1889*, namely: "Every pinned specimen, excepting such as illustrate anatomy only, should bear upon the pin a label giving the place and date of capture, and when necessary a number referring to a catalogue or note-book in which memoranda may be entered to any extent that may be desired." In other words, these particulars become part and parcel of the specimen, so that whenever the insect or object is moved, its history goes with it. In this way the collector makes his collection an index to his outdoor observation and study, and on leaving his possession will be of great interest as well as value to the next owner.

Each collector can devise a form of label for such purpose to suit his own taste as well as convenience. Disks of stiff paper the size of a ten cent piece make neat labels for those who write a small hand. On these, I put the catalogue reference number, the locality where found, the date of capture, and sometimes the distinction of sex, by using the usual astronomical signs in general use, namely, that of Mars ♂ for the male and of Venus ♀ for the female and the sign ☿ for the neuter or worker. By having different coloured paper for each locality, one can see at once all those belonging to the same district in a case.

The pin on which the specimen is fixed is passed through the centre of this disk, so as to allow it to rest about an eighth of an inch from the bottom of the drawer or case. This would not be practical in the low-setting method, to which many British entomologists still adhere—a method which should be condemned as putting the insect in easy reach of parasites and being an exhibition more of pins than of insects.

All this will make considerable extra labour, but will, after a time, be found well worth it; for the collector himself often forgets where or when he got a certain specimen. The name label could be made more interesting to non-entomologists by having the common local name, where known, under the scientific one, and would tend to make the study of insect life more popular.

A NEW SPECIES OF AEGIALITES.

BY THE LATE M. L. LINELL, WASHINGTON, D. C.

During his visit in 1896 to Robben Island, a low rock only 2,000 feet long, situated near the eastern coast of Sakhalin Island, in Okhotsk Sea, Dr. Leonhard Stejneger collected only two species of insects, both Coleoptera. One of them is a species of *Bembidium*, possibly new, but it should be compared with the numerous species from the mainland, which cannot be done at present. The other species belongs to the highly interesting genus *Aegialites*, and is described below as a new species.

Aegialites Stejnegeri, Linell, new species.

Elongate, convex, piceous; upper surface with faint greenish lustre. Antennæ piceous, apruptly clavate. Head broad, finely coriaceous and sparsely punctate. Eyes strongly prominent, very coarsely granulate. Thorax very narrow, distinctly longer than wide, a little broader at base than at apex, widest in front of middle; sides slightly arcuate; disc coriaceous, very sparsely and irregularly punctate, the median line impressed and a shallow fovea on each side. Elytra very short and ovate, abruptly and broadly pedunculate at the humeri, strongly rounded on the sides and very much wider behind the middle, the apices separately, strongly rounded; disc finely rugose, the striæ narrow, scarcely impressed, with small but distinct punctures, entirely effaced at apex. Pygidium and propygidium exposed. Prosternum smooth, meso- and metasternum vaguely rugose, side-pieces sparsely coarsely punctate. Abdomen cori-

aceous, nearly impunctate. Legs piceous, femora more or less testaceous.

Male.—Median and posterior tibiæ abruptly bent near the apex (as in the other species of the genus).* Length, 4 mm., male a little smaller.

Type No. 1390, U. S. N. M.

Five examples collected (Aug. 31, 1896) by Mr. L. Stejneger on Robben Island, Okhotsk Sea.

Intermediate in size between the two previously described species, and very distinct in form and sculpture.

BOOK NOTICE.

Scudder's Revision of the Melanopli.

One of the most important works on Entomology which has been issued by an American author in recent years is that entitled a "Revision of the Orthopteran Group Melanopli (Acridiidæ), with special reference to North American Forms," by Samuel Hubbard Scudder.† It is the more important because it deals with a representative North American group of insects whose members, between April and November, leap from our pathway in profusion whether we stroll through open woodland, sunny meadow, or along the roadside, and yet of whose classification and nomenclature the greatest confusion has heretofore existed. It was only another example showing the truth of the old saying that "the common things about us are those of which we are most densely ignorant."

True, of one of the members of the group, the "Rocky Mountain Locust," *Melanoplus spretus* (Thos.), more has, perhaps, been written than of any other insect on earth, yet it is but one of 207 of its kind which are described at length by Mr. Scudder. The others are scattered far and wide over the continent of North America, and the descriptions of the 92 species hitherto rightfully known to science were distributed through an almost equal range of literature. No better evidence of the need of the "Revision" is necessary than to know that after a careful examination of nearly 8,000 specimens, 7,000 of which belonged to the single genus Melanoplus, the author has in it reduced 47 supposed species to synonyms and has established 18 new genera and described for the first time 115 species.

With a group whose members are so closely akin as those of the

*Dr. Horn, while describing *A. Fuchsii* (Trans. Am. Ent. Soc., 1893, Vol. XX., p. 143), evidently did not have the male before him.

†Proc. U. S. Nat. Mus., XX., 1897, No. 1124, pp. 1–421. Plates I.–XXVI.

Melanopli it has heretofore been almost an impossibility for the specialist—let alone the tyro—to satisfy his conscience as to the status of a specimen which he might have in hand. The available literature was so scattered, and the different authors had seized upon so many different characters as representing what appeared to them the most striking structural features, that the whole mess was worse than a Chinese puzzle. By seizing upon the variations of the abdominal appendages of the male as the most salient features showing specific rank, and by publishing accurate drawings of two different views of the male abdomen of each of the 207 species, Mr. Scudder has done much to render possible the ready identification of each species—a task which otherwise would have been very difficult, owing to the size of the group and the close similarity of many of its members. Analytical keys to genera, and to species where the genus is not monotypic, are also given, and add much to the value of the work, as does also the full list of localities from which each species has heretofore been taken.

Taking into consideration its size and importance, the defects of the "Revision" are very few. The one thing which the tyro will find most lacking is a glossary of the technical terms. In a work of the kind these are necessarily numerous, and though they may be very plain to the author and to specialists, to the beginner they are often extremely confusing. Even a figure of a typical locust with all the parts named would have been a great aid. A tendency to multiply species can here and there be noted, as on p. 138, where *M. bivitattus* is separated from *M. femoratus* only by the colour of the hind tibiæ, which is an exceedingly variable character.

More might have been added along economical lines, but this is a work for the future which the student of the group can now take up with renewed energy. For before one can write of a species he must have a name to handle it by; something which in the case of many of the members of this group has heretofore been lacking. Now, by using a little care and accustoming himself to the technical terms, the student can, by the aid of the "Revision," soon bring order out of chaos, and label his Melanopli with correctness and dispatch. In conclusion, it may be said that any one who will use the work will soon conclude that the aim of the author, "to enlarge and systematize our knowledge of this important group as a basis for future studies," has been well and successfully accomplished. W. S. B.

Mailed March 5th, 1898.

The Canadian Entomologist.

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PROFESSOR J. HOYES PANTON, M. A., F. G. S.

It is our sad duty to record the death of Professor Panton, which took place at Guelph, on the 2nd of February, after a long and very painful illness, which he bore with the utmost patience and resignation. He was born at Cupar, in Fifeshire, Scotland, and was brought out to Canada when a child; his father settled in Toronto at first, and removed, after some years, to Oshawa. He was educated at the Whitby High School and Toronto University, where he graduated with honours in Natural Science in 1877. The following year he was appointed Professor of Chemistry in the Ontario Agricultural College, but after a few years resigned the position and removed to Winnipeg, where he became principal of the Collegiate Institute. In 1885 he accepted the invitation of the Ontario Government and returned to Guelph, where he filled the position of Professor of Natural History and Geology in the Agricultural College till the time of his death. His work there had special relation to economic entomology and botany, on which subjects he issued many useful bulletins to farmers and fruit-growers. He also published two small works on Economic Geology and "Insect Foes," which are valuable manuals of an elementary character. In 1896 Professor Panton attended for the first time the annual meeting of the Entomological Society of Ontario, though he had long been a member, and on that occasion read very interesting and useful papers on "Entomology for Rural Schools" and "Two Insect Pests of 1896—the Army Worm and the Tussock Moth." At the recent annual meeting in October, 1897, he was elected vice-president of the Society, but was unable to attend owing to the illness which had already seized upon him. The following resolution of condolence was adopted at a meeting of the Council held last month: "The members of the Council of the Entomological Society of Ontario have heard with profound regret of the death of their highly respected colleague and vice-president, J. Hoyes Panton, M.A., F. G. S., Professor of Biology and Geology in the Ontario Agricultural College, Guelph. They desire to place on record their admiration for his talents and attainments in natural

science, and their deep sense of the loss which economic entomology in this Province has sustained by his removal in the maturity of his powers and at an age when he was capable of performing much useful work. They beg to offer to Mrs. Panton and family their respectful sympathy in the great bereavement which has befallen them."

SOME RECENT ADDITIONS TO THE INSECT FAUNA OF OHIO.*

BY F. M. WEBSTER, WOOSTER, OHIO.

In the year 1889, Mr. Henry Tryon, Assistant Curator of the Queensland, Australia, Museum, in a report on the insect and fungus pests, published as report No. 1, by the Department of Agriculture of Queensland, pp. 89–91, describes a species of scale insect found on the

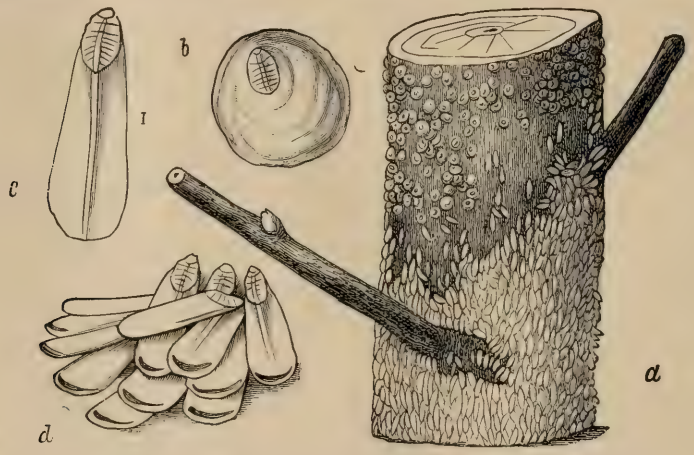

FIG. 7.—*Diaspis amygdali*, Tryon: *a*, branch covered with male and female scales, natural size; *b*, female scale; *c*, male scale; *d*, group of male scales, enlarged. (After Howard.)

peach, as the White Scale, *Diaspis amygdali* (fig. 7), and reported its occurrence both at Brisbane, Queensland, and Sydney, New South Wales. Although described as the White Scale, the author continually refers to it as the peach scale, in his paper, and the latter name has been adopted in America for the species. Of its habits Mr. Tryon states that: "At first its presence is betrayed by small white spots or patches on the bark of the smaller branches; but as the insect increases these soon become

* Read before the Ohio State Academy of Science, December 29, 1897.

in many places confluent, and the individual scales overlap one another, or are contorted by being squeezed together closely, or even appear to lie one over the other, and where the male scale insects crowd together these spots present a more finely chaffy appearance. As it will occur quite up to the tips of the branches, the complete destruction of any tree subjected to the attack of the peach scale, and owing to it, is only a matter of time. When already in patches on the branchlets prior to the formation of the leaves and fruit, in early spring, it does not hinder their formation; the leaves are green as usual, the fruit sets, but is soon retarded in its growth and shrivels up." Writing me under date of November 7th, 1897, however, Mr. Tryon has this to say of its present condition in Queensland: "This Coccid is far from being generally distributed in Queensland, and nowhere have I observed it to act very prejudicially to the trees that it attacks."

In March, 1897, a consignment of Japan Flowering Cherry, both the single and double varieties, was received direct from Japan by the importers in Ohio. A few months later, it was discovered that some of the double flowering variety were infested by a species of scale insect, which proved to belong to this species, and which had not before been known in Ohio. A thorough spraying with kerosene emulsion did nothing more than to check its increase, and did not exterminate it. (It has since been found on *Prunus pandula* and *P. pseudo-ceraceus*, also recently from Japan.)

The distribution of *Diaspis amygdali* and its food plants are also of interest. Mr. T. D. A. Cockerell has given an extended list of the food plants of the species*, and others have since been reported. It is now known to attack *Hibiscus (Abelmoschus) esculentus*, L., and *Gossypium barbadense*, or Jamaica cotton, about Kingston, Jamaica. Cultivated Pelargoniums; the grapevine †, dwarf peach and cherry ‡ (cited as *Diaspis amygdali*, Putnam, in Proc., but correctly in CAN. ENT.), on *Bryophyllum calycinum; Carica papaya;* Persimmon; *Jassium*, in Jamaica; Oleander; *Calotropis procera*, *Capsicum*, *Argyriea speciosa* when under cultivation in Jamaica, also Acanthus, and *Cycus media*. Mr. E. E. Green found it on *Callicarpa lanata* and *Tylophora asth-*

*Food Plants of Scale Insects (Coccidæ), by T. D. A. Cockerell, Proc. U. S. Nat. Mus., Vol. XIX., pp. 725–785, No. 1122.

†Townsend, Jour. Inst. Jamaica, 1893, pp. 283, 378.

‡Cockerell, CAN. ENT., 1895, p. 260.

matica, at Punduloya, India*, and Mr. W. M. Maskell received it on Geranium from Hong Kong †. Mr. D. W. Coquillett found it at Los Angeles, California, on dwarf flowering almond, recently imported from Japan ‡, and the case on dwarf peach and cherry, previously noted, also occurred on trees from Japan. Dr. L. O. Howard reported it some years ago as occurring in an orchard at Molino, Florida, and in another orchard at Bainbridge, Georgia. It was first discovered in this country on some seedling peach trees on the grounds of the Department of Agriculture, at Washington, in 1892. Besides inhabiting Jamaica, it is also found in Trinidad, Martinique, Grand Cayman, Barbadoes and San Domingo.§

Under the caption of "The White Peach Scale," Mr. Charles P. Lounsbury, Government Entomologist for Cape Colony, South Africa, includes the species as one of the insect pests of that Colony. He gives the Fiji Islands as an additional habitat, and states that there is no doubt but that it has been in South Africa for at least fifteen years, and good reasons for believing it to have been there double that length of time. Mr. Lounsbury characterizes the insect as a highly injurious one, the favourite food plants of which are the peach and mulberry, the apricot and plum being severely attacked and sometimes killed, the cherry being liable to be severely attacked, while the pear has been slightly infested. *Myoporum insulare*, Yellow Jessamine, *Jasminum sp.* ? Granadilla, *Passiflora edulis*, *Polygala myrtifolia*, Morning Glory, *Ipomæa sp.* ? Fuchsias and Geraniums all may become very badly infested, while the Cape Gooseberry and other Solanaceous plants suffer to a less degree.‖

Four species of Lady beetles and a Chalcid fly, the latter apparently identical with *Aspidiotophagus citrinus*, Craw., attack the species in Africa. None of these parasites, however, seem powerful enough to hold the scale insect in check.

In October two of the most seriously infested of the trees imported from Japan into Ohio were dug and transplanted to the Insectary of the Experiment Station at Wooster, and one of them enclosed in a breeding cage. Early in December a very minute parasite was reared, and the

* Indian Museum Notes, Vol. IV., p. 4, 1895.

† Trans. New Zealand Inst., 1896, p. 299.

‡ Insect Life, VI., p. 290.

§ Year Book of the U. S. Dept. Agr., 1894, pp. 265–267.

‖ Report of the Government Entomologist for the year 1896, Cape of Good Hope, pp. 76–83.

females were observed in the act of ovipositing in the bodies of the scales on the tree. On these parasites being referred to Dr. L. O. Howard, of the United States Department of Agriculture, he at once pronounced the species as belonging to both a new genus and species, he having previously drawn up a manuscript description from species reared in Paris, France, by Dr. Paul Marchal, who had reared it from *Diaspis ostreæformis*. It has since been discovered that the same insect was reared in Ceylon by E. E. Green, from *Chionaspis vitis*, and it has also been reared from a species of *Aspidiotus* on sweet gum from Savannah, Georgia. The species will now be known as *Archenomus bicolor*, Howard, the description having appeared in the Proc. Ent. Soc., Washington, Vol. IV., No. 2., page 136. There can hardly be a doubt but that this parasite was imported with its host from Japan, and well illustrates the wide distribution of insects, both injurious and beneficial, in articles of commerce. Both the scale insect and its parasite are new to Ohio. While it is almost impossible to determine the native home of *Diaspis amygdali* at the present time, it is likely that this honour will fall either upon Japan or the West Indies, though it might have been first diffused from the East Indies. That the little parasite, *Archenomus bicolor*, Howard, should be reared at such widely separated points as Paris, France; Ceylon; Savannah, Georgia; and Wooster, Ohio, with the probability of the species having been imported into Ohio from Japan, is somewhat surprising, and well illustrates the almost universal diffusion of some of our parasitic insects.

Another scale insect, probably new to Ohio, is the apricot scale, *Lecanium armeniacum*, Craw. I have not been able to find any record of the occurrence of this insect outside of California, where it is found on the apricot, prune and plum especially, but also occuring on the cherry and pear.* My specimens, which seem to be a variety, were found on the Spanish Chestnut, in great abundance.

*California State Board of Horticulture, Division of Entomology. Destructive Insects, Their Natural Enemies, Remedies and Recommendations. By Alexander Craw, Quarantine Officer and Entomologist, Sacramento, California, 1891, pp. 12–13.

GENUS EUSCHAUSIA.

Schausia, Dyar (Arctiidæ), CAN. ENT., XXIX, 212 (1897), is preoccupied by *Schausia*, Karsch (Agaristidæ), Entom. Nach., XXI., 346 (1895). The Arctiid genus may be called *Euschausia*.

HARRISON G. DYAR.

NOTES ON THE EXTERNAL CHARACTERS OF THE SAN JOSE SCALE, CHERRY SCALE, AND PUTNAM'S SCALE.

BY W. G. JOHNSON, COLLEGE PARK, MARYLAND.

March 14th, 1898.—During the last two or three weeks, I have received inquiries from Georgia, Iowa, Kansas, and Canada, regarding the structural external characters of the San José scale *(Aspidiotus perniciosus)*, Cherry scale *(A. Forbesi)*, and Putnam's scale *(A. ancylus)*. I present, therefore, a few notes on these species, which I hope may be of some use to my fellow workers.

It is not a very difficult matter at this time of the year to separate these species at a glance. As is well known, *perniciosus* winters as a partially matured insect, and when the insects are perfectly normal, they are almost always uniformly blackish, with the exuviæ or nipple-like prominences, very conspicuously surrounded by a circle, of the same general colour, as a rule, as the rest of the scale. Of course, on trees badly infested with this insect, there are always many scales of the old males, females, and young, which were not sufficiently covered to protect them at the time cold weather set in; but where a sufficient number of young in good condition can be found, the above character does not vary much, and rarely, if ever, are the pupæ of the males to be found at this time of the year.

Forbesi also winters in a partially matured condition, but male pupæ are conspicuously present at this season, or even very much earlier. The colour of the scales varies considerably, but usually conforms somewhat to the colour of the bark. The nipple-like prominence is very conspicuous and is of an orange, brick-red or purplish tinge. The exuviæ are usually covered with a delicate film or membrane of rather light colour, but are ruptured in most cases, exposing the bright coloured centres. The scales of the males and females are not uniform in colour, being much lighter around the border of the young female and at the caudal end of the male scale. The conspicuousness of the exuviæ and the presence of the pupæ at this time of the year are characters which almost always distinguish this species from *perniciosus*.

The female of *ancylus*, in this location at this season, is much more developed than either of the foregoing species. The young females are usually not so convex as *perniciosus* or *Forbesi*. The exuviæ are lighter than *perniciosus*, and not nearly so bright as in *Forbesi*, varying in

colour from amber to grayish. The general colour of the scale varies also from nearly black to a grayish tinge, depending largely upon the plants upon which it is found. The scale is very delicate, more uniform in general colour, approaching *perniciosus* nearer than it does *Forbesi* in this respect.

The structural characters of the mature females are very marked. In *perniciosus*, the two pairs of anal lobes and the absence of spinnerets are very characteristic. In *ancylus*, while there are two pairs of lobes also, they are usually very broad and flattish, the second pair being widely separated from the first. The presence of the spinnerets is also a distinctive mark for this species, and if the lobes are carefully examined, this species need not be confounded with either *perniciosus* or *Forbesi*. In *Forbesi*, the two pairs of anal lobes approach *perniciosus* much more than they do *ancylus*, but *Forbesi* can be distinguished readily from *perniciosus* by the presence of conspicuous thickenings of the body wall, forming club-shaped masses between the lobes. The spinnerets are always present, usually arranged in five groups in the mature female. In this connection, I might say that I have never seen spinnerets in any of the immature forms of either *ancylus* or *Forbesi*.

There are a few characters presented by the plant which will serve as a mark for identifying the species. On most of our deciduous fruit trees there is a purplish tinge formed about the scales of all three species on young succulent wood. This tinge varies considerably, and depends largely upon the trees, showing more plainly upon some varieties than upon others. With *perniciosus* the purple extends into the bast, and on some very badly infested apple trees I have seen even the young tender wood coloured to bright carmine. I have also seen the fruit of peach badly spotted on account of the attacks of *perniciosus*, and on some varieties the colour extended into the flesh, sometimes to a depth of a quarter of an inch. The purplish tinge caused by *ancylus* and *Forbesi* is usually not so marked as in *perniciosus*. The bast is brightly coloured at times by both these species, but this does not occur as often as with *perniciosus*.

Forbesi also causes a peculiar rough, pitted appearance upon peach and apple that is not usually produced by either *ancylus* or *perniciosus*. The insect seems to retard the cellular growth of the plant immediately surrounding it, and it is not an uncommon thing to find isolated matured females in rather deep depressions. This character is especially prominent on apple and peach in the nursery.

COLLECTING AT LIGHT.

I have read with much interest a couple of papers by Mr. Hanham, of Winnipeg, on the capturing of insects "at light." I had adopted this method in the Old Country with much success, and last season in this district, near the head of Lake Manitoba, I employed the same means and secured a goodly number of specimens. There is no doubt that light is most efficacious in securing to the one who makes use of it many insects that would otherwise be only rarely met with, but while engaged in thus making captures one cannot help being struck—a point to which Mr. Hanham alludes—with the effect light has upon many of the Lepidoptera, or rather with the different effects it has upon different individuals. Now, it seems to me that a careful observation on the part of entomologists in this respect might in due time throw fresh "light" on the habits or even structure of the insects observed. *Why*, I may ask, should light have such a different effect upon insects of the same class? As there is a reason for everything, so there must be here. A casual observer may note that while light acts upon some individuals as an irresistible attraction, to others it is simply repellant, and in the case of others both these effects are combined. Then, again, some are evidently thrown into a kind of stupor under the effect of the glare, and settling down near the attractive force, remain immovable for hours; while yet again others are frantic in their struggles to reach the source of their fascination. This difference of effect, while it points to a dissimilarity of temperament, would seem to indicate a difference of structure, if anywhere, in the eye. Is this known to be a fact; or, if this be not the case, in what does it consist? It seems to me that here is a wide field for investigation, and it might not be lost labour if, during the coming season, those entomologists who adopt light as a means of capture would, as far as possible, classify the insects taken in regard to the effect the light has upon them.

I may say that when using light, I place it before a closed window on the ground floor, and stand outside, and with a net I am able to capture many insects which do not apparently ever settle on the glass, but simply approach within range of the light and then fly away rapidly at an angle, acting much in the same manner as a comet is said to do in regard to the sun. H. Hutchinson, Kinosota, Manitoba.

ERRATUM.

Can. Ent., 1898, p. 15, line 8, for "*not* commonly" read "*most* commonly."

NEW SPECIES OF CHIONASPIS AND NOTES ON PREVIOUSLY KNOWN SPECIES.

BY R. A. COOLEY, B. S., AMHERST, MASS.

In the CANADIAN ENTOMOLOGIST, Vol. XXVII., page 33 (1895), Professor T. D. A. Cockerell stated that Dr. James Fletcher had just sent him a species of *Chionaspis* from Charlottetown, Prince Edward Island -- very abundant on the bark of *Betula papyrifera* — and that in comparing it with Prof. Comstock's description of *C. Lintneri* he believed it to be that species. Following the description of the Prince Edward Island specimens, Prof. Cockerell drew attention to a few probable points of difference between it and Prof. Comstock's description, but as he could find no positive differences he did not separate the form on *Betula*, inferring that the discrepancy was due either to variation in his specimens or the incompleteness of Prof. Comstock's description. I have since received specimens of the form on *Betula papyrifera* from Prof. Comstock and Dr. J. A. Lintner, and the latter gentleman has also lent me Prof. Comstock's co-types of *C. Lintneri*. On comparing the two I was at once convinced that they were distinct, and upon giving Prof. Cockerell my reasons for thinking that the two insects could not be identical, he advised me to separate the form on *Betula*.

While the insect is distinct from *Lintneri*, Comst., I believe it to be only a variety of that species, and have described it as such below.

CHIONASPIS LINTNERI BETULÆ, n. var.

Scale of Female.—Widely pyriform, flat, covered with the very thin epidermis of the bark, giving a brownish tinge to the snow-white scale. Exuviæ bright orange-brown, contrasting strongly with the secreted portion. Texture of scale compact. Length of exuviæ about .8 mm.; total length of the scale about 2 mm.

Compared with typical *Lintneri*, the variety is .5 to 1 mm. shorter, proportionately broader, firmer in texture, with the exuviæ orange-brown instead of yellowish-brown.

Scale of Male.—Of the normal form and colour of the genus, with a distinct but feeble median keel and pale yellow exuviæ. Length about .8 mm.

Unfortunately I have no typical male scales of *Lintneri* with which to compare those of this variety.

Female.—Elongated, with the segmentation moderately distinct.

Pygidium with three pairs of lobes visible; median pair large and well developed, second pair smaller, third pair rudimentary. Median pair contiguous at the base, their inner edges diverging at about a right angle, each lobe being bluntly pointed. Lobes of the second pair each composed of two rounded lobules, of which the inner is the larger. Third pair only slightly produced. A distinct spine at the base of each median lobe, and a small plate and obscure marginal gland opening between the median and second lobes. A large spine above and a small one below the outer lobule of the second lobe. A plate and marginal gland opening between the second and third lobes. Following the third lobe, two spines, two plates, a marginal gland opening, and, after a space, a group of one to three plates, followed first by a marginal gland opening and then by a terminal group of five to nine plates. Dorsal rows of oval gland openings present.

Groups of circumgenital glands compact. Median, 13 to 18; anterior laterals, 25 to 42; posterior laterals, 19 to 28.

Male.—Unknown.

It is impossible to separate the two insects by their pygidia.

Chionaspis Lintneri, Comst., and this variety both belong to the group of *salicis* L., *ortholobis*, Comst.

CHIONASPIS CARYÆ, n. sp.

Scale of Female.—Inconspicuous on the bark of the host plant; elongated, rather irregular in form, of a dirty white colour with brown exuviæ. Anterior and smaller exuvia easily distinguished, the posterior and larger one completely hidden from view by the copious secretion that covers it. Length, 1.7 to 2. mm. Breadth, about .8 mm.

Scale of Male.—Very small and white, with a very indistinct median keel. The pale brown exuvia extending about one-third the total length. Length, .5 to .7 mm.

Female.—Elongated, narrowed toward the anterior end, being broadest toward the posterior end. Segmentation distinct, the posterior segments being produced laterally and bearing numerous gland openings. Rudimentary antennæ distinct, the distance between them about equal to the width of the mouth-parts. Pygidium brown, somewhat triangular, with the first and second pairs of lobes well developed, the third pair being more or less rudimentary. Median pair large, conspicuous, with their inner edges fused together for about half their length, forming one solid piece. Lobes of the second pair each divided into an inner,

oblique, lobule which is sometimes serrated, and an outer straight one, the inner one being larger. Third pair of lobes broad and only slightly produced, with the outer edge serrated. A distinct spine above at the base of each median lobe, and between the median and second lobes a short plate and an obscure marginal gland opening. A large spine above the outer lobule of the second lobe and a smaller one below, and between this lobule and the third lobe a plate and a marginal gland opening. A marginal gland opening at the base of the third lobe, and, outside this lobe, a large spine above and a small one below, followed first by a plate and then by a notch in which is a marginal gland opening. Following this is a spine, one or two plates, and, after a space, the terminal group of about seven plates. Dorsal rows of oval gland openings present.

Circumgenital glands arranged in five groups: Median, 12 to 19; anterior laterals, 21 to 29; posterior laterals, 15 to 22.

Male.—Unknown.

This species also belongs to the *salicis* group, but may be readily distinguished from all others of the genus by the peculiar fusion of the inner edges of the median lobes.

Habitat.—On *Carya* from Washington, D. C.

CHIONASPIS LOUNSBURYI, n. sp.

Scale of Female.—Elongated, sometimes narrow like *Mytilaspis* and sometimes broadened posteriorly like *Chionaspis;* straight, very firm in texture, silvery-white with the exuviæ yellowish or brownish. Secretion covering the second exuvia firm and persistent. Scale more or less covered with a brown bloom, which occurs naturally on the surface of the leaves of the host-plant. Length of exuviæ about 1 mm.; total length, 2.4 to 3 mm.

Scale of Male.—Very loosely constructed and fragile; median keel present, but very indistinct, invisible, in fact, except in the more perfect specimens. White, with the exuvia pale yellowish or colourless. Length, 1.2 to 1.5 mm.

Female.—Elongated, narrowed at the anterior end, but with the abdominal segments of about equal width; mouth-parts occupying fully one-half the width of the body at the anterior end. Pygidium with a median notch, the two sides being formed by the first pair of lobes, which are large and well developed in some individuals, or small and rudimentary in others. Second pair present, third pair obsolete. Median lobes

when well developed rounded on the posterior extremities, sometimes faintly serrate, with a pair of spines in the notch; when rudimentary, only slightly produced, with the pair of spines in the notch often inconspicuous or absent. Second lobe composed of two lobules, inner large and rounded, outer smaller and bluntly pointed. Two spines anterior to the outer edge of each median lobe. A well-developed plate and a marginal gland opening between the median and second lobes. Two spines at the base of the second lobe, and outside this lobe, a second plate, followed by a deep notch in which is a marginal gland opening. Then two spines and a third plate followed by a second notch in which is a marginal gland opening, and, after a short space, the fourth and last plate. Dorsal rows of oval gland openings present.

Five groups of circumgenital glands: median, 5 or 6; anterior laterals, 10 to 13; posterior laterals, 13 to 27.

Male.—Unknown.

This species may be distinguished from other known members of the genus by the characteristic appearance of the scales, particularly those of the female. It belongs to the group of *eugeniæ* (Green), *chinensis* (Ckll.), etc., or those having a terminal median notch in the pygidium.

Habitat.—On an unidentified plant from Ceres, Cape Colony, South Africa, sent by the Government entomologist, Mr. Charles P. Lounsbury, to Dr. L. O. Howard, at Washington, and also to the writer. The female scales are indiscriminately distributed over both surfaces of the leaves, while the male scales occur in groups chiefly on the under surface.

I take pleasure in naming this insect after its discoverer, Mr. Lounsbury, who is doing very valuable and praiseworthy work in economic entomology.

CHIONASPIS HOWARDI, n. sp.

Scale of Female.—Elongated, narrow, sides nearly parallel. White, with the exuviæ variable in colour, being yellow, brown or green; two parts of the same exuvia often of different colours. Second exuvia obscured by the waxy secretion that covers it. Length of exuviæ about .7 mm.; total length of the scale, 1.5 to 1.7 mm.

Scale of Male.—Elongated, sides parallel, with a distinct median keel; creamy white with the exuvia of about the same colour. Length about 1.2 mm.

Female.—Elongated, very slightly broadened posteriorly, with the segmentation not pronounced, the posterior segments having numerous

gland openings on the sides. Pygidium cleft at intervals and having the margin distinctly denticulate, more plainly so in some specimens than in others. Median and second pairs of lobes well developed, often with thickenings of the body wall extending anteriorly from them; third pair wholly wanting. Median pair separated by a distance about equal to the width of one of the lobes. Each lobe of the second pair composed of two distinct and separate lobules, the inner one being larger and often approximating the median lobes in size. Interval between the median lobe occupied by two more or less distinct teeth, anterior to which is a transverse oval gland opening. Two spines anterior to each median lobe, and immediately outside each median lobe, a large plate, anterior to which is a spine. An oval gland opening between this plate and the second lobe, and, outside this lobe, a second plate. a denticulate space with two marginal gland openings and a spine, then one or two plates, followed by another denticulate space with two marginal gland openings and a spine, and, lastly, the terminal group of two plates.

Five groups of circumgenital glands; median, 5 to 7; anterior laterals, 9 to 14; posterior laterals, 7 to 14.

Male.—Unknown.

Habitat.—On East Indian bamboo from the Department of Agriculture, Washington, D. C.

I take pleasure in naming this insect after Dr. L. O. Howard, United States Entomologist, the extent and value of whose work is well known by all workers in entomology.

CHIONAPSIS LINTNERI, Comst.

Since this species was described in 1882, in Prof. Comstock's second Report of the Department of Entomolgy of the Cornell University Experiment Station, no mention has been made of its having been discovered in other localities, except in the instance mentioned in a previous paragraph of this paper. On January 12, 1898, Mr. A. F. Burgess, an assistant in the scientific department of the work of extermination of the Gypsy moth, found a *Chionaspis* abundant on *Alnus* in a swamp in Stoneham, Mass. I made an examination of these specimens and found them to be *C. Lintneri*, Comst. The specimens occur only at the bases of the young trees.

CHIONASPIS MINOR, Mask.

In the fall of 1897, Prof. A. L. Quaintance sent me a piece of a branch of a "China-tree" *(Melia azedarach)* badly infested with a white

Chionaspis, which, on examination, proved to be *Chionaspis minor*, Mask. From the appearance of the branch, it occurred to me that the species might be doing harm, and, on writing to Prof. Quaintance, I was informed that it was severely attacking the "China-trees" at Braidentown, Florida, having apparently killed many trees on the main street of the town. This is the first time this species has been reported from the United States, so far as I can learn, and as it has quite a large number of food plants, its introduction is an important matter.

Chionaspis minor was originally described from New Zealand, and is quite generally distributed in the West Indies. Mr. Alexander Craw has also sent me specimens which arrived at San Francisco, Cal., on an unidentified plant from Panama. The species is known to attack Palm, *Vitis vinifera*, *Rhipogonum scandens*, *Persoonia*, *Hibiscus*, *Capsicum*, *Erythrina*, and *Melia azedarach* (China-tree).

A NEW GRASSHOPPER FROM ONTARIO.

BY E. M. WALKER, TORONTO.

Melanoplus abortivus, new species.— Size rather small, especially the male. Female nearly as large as *M. femur-rubrum*, but proportionately much stouter.

Frontal costa nearly reaching the clypeus, subequal, though sometimes a little contracted toward the vertex, plane except a slight depression at the ocellus, or in the male generally slightly sulcate from just above the ocellus, rather thinly punctate. Vertex with the margins slightly elevated, gently expanding in front of the eyes for a distance about equal to or somewhat less than that between the eyes in the female, rather greater in the male. Interspace between the eyes rather broader than the first antennal joint in the male, nearly twice as broad in the female. Eyes rather prominent, especially in the male, of moderate size. Top of head moderately prominent, evenly convex. Antennæ about as long as the head and pronotum. Anterior margin of pronotum truncate or very slightly emarginate, posterior margin obtusely rounded. Sides of pronotum in the male sub-parallel, only slightly divergent posteriorly on the metazona; in the female distinctly divergent throughout their entire length, so that the width of the pronotum is about one-third greater at the posterior than at the anterior margin. Dorsum of pronotum broadly convex and more or less distinctly and finely punctate on the metazona. Median carina entirely obliterated or very indistinct on the prozona, distinct and

somewhat elevated on the metazona. Lateral carinæ distinct except towards the posterior margin of the metazona. Posterior margin of the lateral lobes very oblique, forming an angle of about sixty degrees with the dorsum, more or less distinctly angulate with the sinuous lower margin ; metazona densely punctate, prozona glabrous and shining. Prosternal spine short, bluntly conical, slightly bent backward, transverse in the female. Tegmina not longer than the pronotum, generally distinctly shorter, ovate in outline, the greatest breadth being about two-thirds the length ; sometimes barely meeting on the dorsum, but more often separated by a space of variable width, which is occasionally equal to nearly half the greatest width of the tegmen. Wings reduced to mere scales which do not quite reach the tympanum. Cerci of the male not quite reaching to the tip of the supra-anal plate, simple, about two-thirds as broad at the base as long, tapering to a blunt rounded point, which is not or scarcely bent inwards, outer margin nearly straight, inner slightly sinuate ; under surface slightly convex near the base. Supra-anal plate with a narrow median furrow and a broader one of about equal depth on each side ; triangular in outline, with rounded sides ; width at base about two-thirds the length. Furcula minute, not more than about one-sixth length of the supra-anal plate, about as broad as long, slightly approximate and somewhat constricted in the middle. Sub-genital plate narrow, elongate, entire, terminating in a blunt point. Hind femora stout, reaching beyond the tip of the abdomen in the male, not quite to the end as a rule in the female. Colour of dried specimens : Above, dull grayish-brown, somewhat paler on the abdomen in the female, more or less distinctly speckled with darker gray. A shining black band runs from the posterior border of the eye across the upper half of the lateral lobe of the pronotum and downward to the middle coxa, and also backward along the side of the abdomen, fading away near the last segment. It encloses an oblique whitish spot running from the base of the tegmen to the hind coxa. Below this black band the whole of the head and thorax is yellowish-white in well-preserved specimens, deeper yellow on the metasternum. There is also in the female generally a short whitish line along the lateral carina of the pronotum, which is sometimes continued downward and forward in an interrupted line across the black band. Venter pale yellow, darker in the female. Hind femora yellowish-brown, under surface reddish-yellow, crossed on both outer and inner surfaces by two oblique, more or less distinct, dusky bands. Hind tibiæ coral-red. Fore and

middle legs yellowish, fleeced with reddish-brown. Antennæ dusky paler at base.

Length of antenna: ♂ 5.5 to 7 mm., ♀ 6.8 to 7.5 mm.
" " head and pronotum: ♂ 6 to 7 mm., ♀ 6.8 to 8 mm.
" " hind femora: ♂ 9 to 9.5 mm., ♀ 10 to 12 mm.
" " tegmen: ♂ 3 to 3.5 mm., ♀ 3.5 to 5.5 mm.
" " body: ♂ 14.5 to 16.7, ♀ 20 to 24 mm.

This species is very closely allied to *M. mancus*, Smith, from which it can be distinguished as follows: In *mancus* the cerci of the male are much longer than in *abortivus*, reaching quite to the end of the supra-anal plate, sometimes beyond it, while in *abortivus* they are always distinctly shorter. In *mancus* they are fully twice as long as broad, generally more than this, the apex considerably expanded and distinctly incurved; the furcula is much longer than in *abortivus*, being a fourth as long as the supra-anal plate, while in the latter they are never more than one-sixth as long. In *abortivus* they are about as broad as long, slightly convergent and constricted in the middle, while in *mancus* they are distinctly longer than broad and somewhat divergent. The females are extremely difficult to separate from those of *mancus*, there being scarcely one permanent distinguishing character.

The lateral carinæ of the pronotum are more prominent in *abortivus*, there being a distinct angle between the dorsum and lateral lobes, while in *mancus* this angle is rounded off. In *abortivus* the posterior margin of the pronotum is more or less angulated with the lower margin, in *mancus* there is generally no semblance of an angle here.

Described from fifty-five specimens, of which twenty-five are males and thirty females. Most of these were taken at De Grassi Point, Lake Simcoe, Ontario, and in neighboring localities. The only other locality where I have seen it is Aurora, Ontario, about 22 miles further south. It is found in openings in rich shady woods and on their borders, especially where the timber is of a coniferous growth. I have found it most common in paths in swampy woods composed of spruce, balsam fir, tamarack, paper birch, etc. Seldom more than one or two are seen at once, though by diligent search specimens can be secured any day during the proper season, which lasts from the first week in July, or a little later, to the beginning of October. The earliest date upon which I have taken a specimen is July 2, 1896.

Figures of this species will appear later, in connection with my "Notes on Some Ontario Acridiidæ."

NEW SPECIES OF NORTH AMERICAN MYRMELIONIDÆ.—I.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

Brachynemurus Coquilletti, new species.

Male.—Length, 33 mm.; expanse of wings, 44 mm.*; greatest width of anterior wing, 5.6 mm.; length of antenna, 6 mm.; luteous, marked with dark fuscous; clothed with white hairs, thickly so on abdomen; apical segments of abdomen with some black hairs among the white ones.

Face flat, luteous, bordered above by a pitchy-black band separating the antennæ and narrowly bordering them in front and on the outer side; a longitudinal median black line extends from this band almost to the clypeus. Circum-ocular area luteous, except along the anterior portion of the vertex, where it is fuscous, and on the margin next the eye, opposite the middle of anterior joint of maxillary palpiger, where there is a fuscous spot. Clypeus rather short, luteous, on either side anteriorly an impressed spot; above, a few black bristles. Labrum transverse, luteous; rounded laterally and narrowed anteriorly, nearly straight in front, where it is sparsely clothed with light-coloured hairs. Mandibles piceous, black at tips.

Maxillary palpi of moderate length, luteous; first two joints short, about as broad as long, subequal; third joint a little longer than first two together, somewhat curved, enlarged apically; fourth joint a little shorter than third; last joint as long as third, slightly fusiform (a little swollen medially), apically piceous; tip truncate, pale.

Labial palpi about same length as maxillary, luteous; first joint twice as long as broad; second joint about twice as long as first, curved, enlarged apically; apical joint as long as second, fusiform, strongly narrowed apically, where it is piceous; sparsely clothed with dark hairs; tip fine, truncate, pale.

Maxillary palpigers luteous. Labium and labial palpigers luteous. Mentum luteous, with a longitudinal median dark line, at the posterior end of which is a long bristle†. Gula luteous.

Antennæ clavate, as long as head and thorax, luteous, joints with a fuscous ring at base, clothed with some very short dark hairs or bristles; the two basal joints luteous, clouded with piceous; basal joint set in a yellow ring which is widest in front.

*One specimen, a co-type, collected at San Simon, Arizona, July 5, 1897, by Mr. H. G. Hubbard, expands only 41 mm.

†This bristle is not apparent in some specimens.

Vertex elevated behind, rounded, luteous; post-antennal area fuscous; two transverse fuscous bands on elevated portion; these bands merge into one along the middle third*; a short fuscous prolongation posteriorly along the longitudinal median furrow.

Pronotum as broad as long, narrowed anteriorly, sparsely clothed with rather long white hairs, more thickly so on margins; sides sinuate, front emarginate; anterior angles rounded; luteous, a longitudinal fuscous band each side of middle line; these bands are approximate or coalescent behind the transverse furrow, more widely separated before it; another longitudinal fuscous band on the outer side of each middle one, behind the transverse furrow. Lateral carinæ luteous. Beneath luteous, a longitudinal fuscous streak on each side near carina.

Mesothorax sparsely clothed with white hairs; lobes of dorsum strongly elevated; anterior lobe fuscous, a spot each side, and one at posterior margin medially, luteous; lateral lobes fuscous, a few luteous spots near the articulation of wings; on each of these lateral lobes a luteous triangle whose apex terminates near the mid-dorsal line; posterior lobe luteous, a longitudinal median fuscous streak which is wider anteriorly; posterior angles luteous, each with a U-shaped fuscous streak. Below mostly fuscous, at base of wings and legs luteous.

Metathorax sparsely clothed with white hairs; dorsum with lobes less elevated than those of mesothorax; anterior lobe luteous, with a U- or V-shaped fuscous marking; lateral lobes each with a luteous triangle similar to those on corresponding lobes of mesonotum; base of wings above fuscous; posterior lobe similar to that of mesonotum. Sides and below mostly fuscous; bases of legs and wings, and a few spots, fuscous.

Abdomen longer than wings, slender, thickly clothed with white hairs, a few black ones apically, fuscous, the basal segments above luteous with a median black line.

Appendages short, half as broad as long, one-fourth the length of last segment, cylindrical, obtuse on tip, luteous; clothed with long black hairs or bristles; between the appendages below, a short triangular luteous plate.

*In one specimen, a co-type, collected in Los Angeles County, California, by Mr. Albert Koebele, the bands are interrupted at the longitudinal median furrow; in another co-type, collected July 5, 1897, at San Simon, Arizona, by Mr. H. G. Hubbard, these bands are almost enterely merged into one.

Legs of moderate length, luteous, sparsely sprinkled with black or brownish-black at bases of hairs and spines; sparsely clothed with dark hairs and beset with long black spines. Tibial spurs as long as first three tarsal joints, moderately curved, rufo-piceous. Apices of tarsal joints black, third and fourth joints entirely so. Claws as long as fifth tarsal joint, moderately curved, rufo-piceous.

Wings somewhat falcate at tips, hyaline, clothed on venation, and sparsely on membrane, with dark hairs; posterior borders of wings subapically strongly arcuate, almost angulate, making the wings quite broad before tips. Pterostigma luteous, on inner side a black spot formed by junction of sub-costal and median veins; before the pterostigma a few intercostals forked. Principal longitudinal veins luteous, interrupted at junctures of transversals with black; a longitudinal vein between median and submedian entirely luteous; other longitudinal veins and transversals fuscous, interrupted with luteous.

Anterior wings with the anterior transversals springing from the submedian vein above, and some other veins posterior to it, with small fuscous spots; posterior wings shorter than anterior, immaculate. Posterior borders of both wings fringed with dark hairs.

Female.—Length, 25 mm.; expanse of wings, 44 mm.; greatest width of anterior wing, 6 mm.; length of antenna, 5 mm.*

Antennæ more clavate than in male. Abdomen a litter shorter than anterior wings, not luteous on basal segments above; tip luteous; superior parts split, clothed with long dark hairs and beset with coarse black spines at apex; below, two short, cylindrical appendages, clothed with long dark hairs.

Type.—No. 3814, U. S. National Museum. One male, collected July 5, 1897, at San Simon, Arizona, by Mr. H. G. Hubbard.

No. 3814a, U. S. National Museum. One female collected in San Bernardino County, California, by Mr. D. W. Coquillett.

Cotypes.—Collection U. S. National Museum. Two males, one with antennæ and apical segments of abdomen gone, collected July 5, 1897, at San Simon, Arizona, by Mr. H. G. Hubbard; one male with fragmentary abdomen, collected in August, in Los Angeles County, Cali-

*This is a small specimen; a female, co-type, from Los Angeles County, California, collected in August by Mr. Albert Koebele, is 29 mm. in length and expands 51 mm. A third specimen, also a female co-type, from the same locality, collected in July by the same person, is slightly smaller than this latter.

fornia, by Mr. Albert Koebele ; two females collected by the latter in Los Angeles County, California, one in July the other in August.

This species is peculiar chiefly through the shape of the wings, and through the very slender abdomen. Luteous is the prevailing colour in the males, fuscous in the females. The male appendages are very similar, in size and shape, to those of *B. longipalpis*.

CONCERNING TICKS.

BY REV. W. J. HOLLAND, PH. D., LL. D., CHANCELLOR OF THE WESTERN UNIVERSITY OF PENNSYLVANIA.

The other day a distinguished artist friend of mine called upon me with a small bottle containing some whiskey, which by its odour I judged was good, when he first took it from his flask, and in it was what he denominated a " bug." He told me that he had experienced " one of the most wonderful adventures of his life " in connection with the specimen he put before me, and went on to tell me that during the past summer, while sketching in the mountains, he had discovered one evening, when undressing, a small, dark swelling on his breast. He thought it to be a little abnormal growth on the skin and paid no attention to it. From time to time he noticed it afterwards, when retiring, and found to his considerable alarm that it was gradually growing larger, and evil thoughts of cancer, tumors, and what not, began to float through his mind. Finally, after some two weeks had passed, one evening, as he expressed it, "while fooling with the darned thing it came off." He laid it down on the dressing-case before him and was presently astounded to see it slowly crawling away from the spot. Then a small bottle was sought out, the whiskey flask was brought into requisition, and the " bug " was safely bottled, to be referred to me for an explanation. This proved not difficult to give. The specimen was a well-developed example of *Ixodes albipictus*, Packard. We had a hearty laugh together, and my friend assured me that he "would know better the next time, and not let such creatures establish such a lengthy abode upon his person." His adventure recalled to me a letter which I have long had in my possession, intending to publish it, as it is very well written, and adds a touch of humour to the subject. The specimen referred to in the letter is in my collection, and proves to be an example of *Ixodes bovis*, a very common plague in the south-western part of this country. The writer of the letter, a young friend of mine, says :

" I had no idea that my bug was of interest to anybody but myself, but I assure you I was glad to let him go.

"We sleep on the ground all summer here in New Mexico, with no protection and but little covering. Bugs of all kinds, and even centipedes, crawl under and into our beds for shelter. I was on the Rio Gila, near the Arizona line, sleeping on the sand, with a blanket under me and my boots for a pillow, when I absorbed the specimen you have now in your collection. It was probably smaller at that time, as the pain and irritation gradually increased for about two weeks.

"I was seventy-five miles from a physician, and had no idea of consulting one, until the pain became unbearable. In the meantime, I had used all the common domestic remedies which were at hand, for what I thought was earache. Finally the pain destroyed sleep and annoyed me constantly during the day, and I was driven against my will to consult a physician. He examined my ear, told me it was much inflamed, gave me a 'wash,' which I used twice without effect, and I carried the thing two weeks longer. The hearing in my right ear was affected from the very first, but during the last week I lost the ability to hear in both ears, and the pain became almost intolerable. I went to Trinidad and consulted a doctor there, who after a very thorough examination told me it was polypus. In his efforts to remove this he dragged out the bug. My hearing was at once restored, but the irritation remained for some time.

"I have heard of two other cases of the same kind, which were relieved by the injection of tobacco-juice, in one instance after the man had become frantic with pain. These creatures are often found in the ears of cattle and occasionally of horses.

"All results flowing from my enforced connection with the bug have disappeared, the inflammation has vanished, my hearing is as good as ever, and when a tick next gets into my ear I will try the tobacco cure at once, notwithstanding Aunt Beck's objection to its use in any form."

The genus Ixodes is of considerable extent, but, so far as is known to the writer, without taking especial pains to look up the entire literature, has not received revisional treatment during the past forty years. A search of the Entomological Record shows that many species have been described in the time which has elapsed since this valuable publication was commenced, but no student has apparently addressed himself to the task of monographing this genus and its allied genera. A thorough revision of the Ixodidæ is a desideratum, which it is to be hoped some enthusiast may before long undertake to give us.

MANITOBA BUTTERFLIES.

As the result of last year's work I have an addition to make to the list of Manitoba Diurni, which appeared in this magazine about two years ago. On July 3rd, when driving across an outlying portion of my farm, in a flowery glade amongst some scrub I saw an unusual looking "*fritillary*" hovering over and settling together with *Argynnis Lais* upon some lillies in bloom. On netting it I found it to be a "green wing," which has been determined by my friend, Dr. Fletcher, to be *A. Edwardsii.* In a short time I secured three or four more examples of this Western species from the same place. On the 7th July I found it again in a similar locality, about a mile south of where I had originally seen it, and secured some more specimens, all of which, except perhaps a couple whose wings were slightly chipped, were in good condition. I went out again on the 10th, but though *Lais* and *Cybele* were on the wing, I did not see *Edwardsii.* A correspondent at Brandon (in this Province), Mr. Boger, writes me that he also took one or two "green wings" this summer; Brandon being 60 or 70 miles to the N.-W. of me. He was, when writing, under the impression that his was *A. Nevadensis.* It would be a very curious fact if both species (?) visited Manitoba at the same time, and it would look very much as though they were only varieties of one species. I have just noticed among my series one specimen that varies slightly from the majority, and is somewhat like the description given of *A. Nevadensis. Colias Cæsonia* did not again present itself, though I saw in 1896 at least half a dozen specimens besides the two I caught.

Mr. A. W. Hanham, of Winnipeg, has referred to my collection in the very useful list of Manitoba moths which commenced in the December number of this magazine. I am sorry to say that I am unable to give him any assistance worth mention, through the bulk of my collection being unnamed. This is to be regretted, as I think I might be able to make some additions, and the list should be as complete as possible. He has kindly offered his assistance in naming my insects, and anything he finds new amongst them can appear in a supplementary list at some future date. We poor collectors in the Wild West labour under many and very great difficulties. Not only do specimens suffer more or less in transit through the post, but boxes do not always receive due care and attention "at the other end." The practice, too, of specialists annexing all new and rare species and interesting varieties is much to be

deprecated. I think entomologists might be more generous to one another. For my own part I would gladly pay handsomely in specimens to anyone who would name for me what I send, but I do not like parting with *unique* specimens. I collect only Manitoba insects, and have several species of which I have only seen single examples during the seventeen years I have been in the country. I have them annexed by some specialist. What then? I might, having taken the species, replace it by specimens from Nevada or Colorado, let us say. But they would not be Manitoban specimens, and very likely would present certain minor differences. All thanks and credit being given to those who, through greater advantages and opportunities, have acquired a knowledge which it is impossible for many of their brethren who are less favourably situated to gain, and impart that knowledge, but they exact too heavy a price for it, and by so doing, instead of encouraging the study of entomology, confine it within narrow limits by their action.

E. Firmstone Heath, Cartwright, Manitoba.

TRYPETA SOLIDAGINIS.

BY MRS. A. J. SNYDER, BELVIDERE, ILLINOIS.

A year ago last autumn, while rambling about the fields, we took especial notice of the galls upon the golden-rod. We saw that there were two kinds, the elongated and the round. We knew that from the former came a tiny moth, well-known to us, and from the latter a fly with which we were not familiar, or, if familiar, not known to come from this gall. The elongated galls were all empty, but the round ones we found upon examination contained each a small white grub. We gathered a quantity of the galls and placed them in a jelly glass on the writing table where they would be constantly before us for observation.

On the following twenty-first of April we noticed something peculiar about one of the galls. There was a movement at one little spot that soon looked like a tiny drop of water. We were on the alert instantly, and with microscopes in hand awaited developments. Upon closer investigation the "drop of water" looked more like a membranous bubble (ptilinum, I think is the correct term for this sac-like organ). With the naked eye it could be seen to expand and relax, and upon it were observed tiny drops of water or some liquid substance,— sweat drops as we shall call them.

The following is a minute description (for an amateur) of the emergence of the fly as seen through a hand lens. In the first place

there seemed to be a depression and ridge like the arcs of a great circle cutting each other at right angles and dividing the sac into quarters. The "sweat drops" stood out upon the ptilinum like little beads as it expanded and relaxed gently.

Suddenly the ptilinum apparently withdrew into the aperture of the gall, being almost out of sight, and then it as suddenly swelled out; at the same time there was a change in the position of the "sweat drops," and they were larger than before.

After this great relaxation and emergence the fly came out rapidly until the eyes were visible. The ptilinum extended far out above the eyes, overshadowing them. The appearance of the visible part of the fly at this period reminded one strongly of a back view of a head that is bald, the eyes of the fly taking the place of the ears. Under the magnifier the eyes were distinctly purplish.

After the head and part of the body were out of the gall the relaxations of the sac were shown by depressions. These depressions were across the top of the sac — laterally — and were four in number. There were also three depressions at the back — horizontally. Sometimes the fly did not seem to gain much in an effort after a relaxation, and at other times the amount of emergence was quite noticeable. When the mouth-parts became visible they were seen to open and the ptilinum to relax simultaneously with each effort. When the fly had nearly emerged the efforts became greater, and the ptilinum sank very much at each relaxation.

After a final struggle the fly crawled slowly out upon the gall and rested. The ptilinum partially collapsed, relieving the fly of its top-heavy appearance, and gradually, and at the same time almost unnoticeably, it was all seemingly absorbed, and a very natural looking fly was before us. We noticed the emergence of a number of these insects, with the same results, as far as we could determine.

The disappearance of the ptilinum at the final stage was almost a mystery. It would seem to be gradually disappearing, and yet, all at once, it was gone and there was not the slightest trace of it. Perhaps a stronger microscope would have revealed more.

We opened some of the galls before the flies emerged to see how heavy a door they had to open. We found the pupa in a small excavation at the centre of the gall, and a circular channel, less than two millimeters in diameter, leading from it to the outside of the gall, only the mere skin of the enlarged stem serving as a covering.

A NEW BOMBYCID.

BY R. OTTOLENGUI, NEW YORK.

Cisthene striata, nov. sp.—Antennæ and palpi black. Head, prothorax and patagia creamy, the prothorax of a deeper shade. Thorax above dull gray. Abdomen rose coloured above and laterally, gray ventrally. Legs brownish-gray.

Primaries, upper side, dull gray, the veins all of a deeper shade, giving the wings a striated appearance. Three narrow longitudinal stripes of creamy colour cross the wing. The first along the costa narrowing and disappearing at the apex. The second along the median vein, arising near the base and reaching the outer margin; this stripe is widest centrally and pointed at each end. The third is between this and the inner margin. It begins at the base and terminates at the upper edge of a distinct yellow spot near the angle. There is also a narrow yellow streak along the inner margin from the base to the spot mentioned. Under side, gray, the more distinct marks of the reverse showing faintly except the spot near the angle which is distinct and rosy instead of yellow.

Secondaries, upper side, rosy with gray apices. Reverse the same. Expanse 17 mm. Described from one male in the collection of the author. Taken at Miami, Florida, by Mr. Brownell.

COCKERELL ON PANURGUS AND CALLIOPSIS.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Prof. Cockerell's treatment of these genera is likely to create an erroneous impression, which should be corrected wherever his statements are made. In Trans. Am. Ent. Soc., XXIV., 150, he says: "It is perfectly evident that the so-called species of *Panurgus* of North America are not all of the same genus." In the Dec. CAN. ENT., p. 287, he says: "The result is extremely interesting, and seems to show that we have for many years been placing bees in genera to which they by no means belong." To those acquainted with the literature and the bees in question this has been clearly understood, at least since it was distinctly stated by Cresson ten years ago. In the Synopsis, page 134, Cresson says: "The genera *Panurgus*, *Calliopsis* and *Perdita* have been made the receptacle for a number of species which do not properly belong to either of these genera, and have been placed there provisionally until more abundant material can be obtained, when a more careful study may be made of their characters." Mr. Cresson wisely intended to save himself and others from fabricating such genera as *Pseudopanurgus* and *Hemihalictus*.

A NEW EGG-PARASITE OF THE PERIODICAL CICADA.

BY L. O. HOWARD, WASHINGTON, D. C.

The Chalcidid subfamily Trichogrammatinæ is composed entirely of species parasitic in the eggs of other insects. A synopsis of the genera has recently been published by Dr. Chr. Aurivillius in "Entomologisk Tidskrift" for 1897, pp. 249–256, apropos to the establishment of a new genus (Oophthora) for a species which he has reared in Sweden from the eggs of *Semblidis lutariæ*. In this synopsis of the genera Dr. Aurivillius makes Lathromeris, Förster (Hymenopt. Stud., 1856, 2, pp. 87–89) a synonym of Chætostricha, Haliday (An. and Mag. Nat. Hist., Ser. 2. Vol. 7, 1851, p. 212).

Without being able to consult types, it is obvious to the writer, from comparison of Haliday's original description with that of Förster, that the two genera cannot be synonymous since Lathromeris has a compact 4-jointed club, whereas Chætostricha is described as having the 3rd joint broad, with the 4th, 5th and 6th forming the club (3-jointed). Moreover, Lathromeris has a ring-joint which was not mentioned in the description of the Halidayan genus. The following description, therefore, may be considered as reviving the genus Lathromeris. The additional "kleines griffelförmiges endglied" which Förster states appears to be present with Lathromeris is not present with the following species, but the club bears several long apical hairs which, were they moistened and stuck together, would have the appearance described by the famous German hymenopterologist.

LATHROMERIS CICADÆ, new species.

Female.— Length, .74 mm.; expanse, 1.48 mm.; greatest width of fore wing, .21 mm. Body long and slender, abdomen acuminate and longer than head and thorax together; antennæ short, clavate, scape rather stout, pedicel still stouter and half as long as scape, ring-joint very minute, almost imperceptible, club stouter than pedicel and as long as scape, compact but rather plainly divided into 4 subequal joints, the apical one being slightly the longest, fusiform in shape and with rather long delicate hairs, especially toward the tip; wings ample, with short marginal cilia; stigmal vein not curved and extending into disk of wing at an angle of about 45 degrees from costa. Colour sordid yellowish, occiput black; pronotum dusky, black at sides; abdomen dark at sides; eyes coral red; ocelli very dark red, almost claret coloured; antennæ slightly dusky.

Male.—Slightly shorter than female; abdomen with parallel sides and rounded at tip; antennæ with a dark blotch at base of club.

Described from two males, two females, reared from eggs of *Cicada septendecim*, collected by T. Pergande, in Virginia, just across the Potomac River from the City of Washington, in July, 1895. All four specimens mounted on a single slide. Type No. 3850, U. S. Nat. Mus.

NOTES ON SOME BEES OF THE GENUS ANDRENA FROM HARTFORD, CONNECTICUT.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

The following notes are based on specimens collected by Mr. S. N. Dunning, all at Hartford :—

(1) *Andrena Dunningi*, n. sp.—♀. Length 12 mm.; black, with ochraceous pubescence. Facial quadrangle broader than long; lateral facial depressions covered with appressed pubescence; clypeus shining, with large close punctures, median line impunctate; front below ocelli irregularly striate, a keel descending from middle ocellus; vertex minutely roughened, with ill-formed punctures; antennæ reaching to tegulæ, wholly dark, first joint of flagellum a little longer than the two following together; mandibles dark, rufescent at extreme tip; *process of labrum broad and low, but very large, gently curved;* thorax, even the metathorax at base, quite densely covered with long fulvo-ochraceous hair, that on pleura like that above; *mesothorax minutely tessellate or lineolate, with strong deep punctures;* enclosure of metathorax granular, ill-defined; tegulæ shining, dark brown; wings strongly flavescent, not darkened at apex, stigma ferruginous, nervures dark brown; *second submarginal cell very broad, nearly as large as the third,* receiving the first recurrent only just beyond the middle; legs black, the small joints of the tarsi dark reddish-brown; *pubescence of femora, and of hind tibiæ, ochraceous; that of the other tibiæ, and all the tarsi, very dark chocolate brown,* shining paler in certain lights; abdomen shiny, minutely tessellate, *with quite numerous but very small and weak punctures; surface of abdomen bare, without bands; apex densely clothed with fulvous hair;* venter with long fulvous hairs.

Hab.—Hartford, Connecticut, May 26, 1895 (S. N. Dunning). Superficially this species looks much like *A. vicina*, but the pubescence of the apex of the abdomen at once separates it. It is very much like *A. pruni*, but that has the punctures of the abdomen much stronger, the basal joint of the hind tarsi is longer and narrower, and the colour of the tarsal pubescence is entirely different.

(2) *A. Forbesii*, Rob.—♀. April 19. Beside the colour of the pubescence, *Forbesii* is distinguished from *rugosa* by the smaller and more numerous ridges on the base of the metathorax; about 20 in *Forbesii*, about 12 or 14 in *rugosa*. The abdominal hair-bands of *Forbesii* may be practically obsolete.

(3) *A. Cressonii*. Rob.—♂, April 30; ♀, April 19. The ♂ is not quite typical in the face-markings.

(4) *A. bipunctata*, Cress.—Many males, April 19 to May 18.

(5) *A. vicina*, Sm.—April 21 to June 18. Very many. None are var. *errans* (*A. errans*, Sm.). At Olympia, Washington State, Mr. T. Kincaid takes the typical form and var. *errans* together, the variety being the most numerous.

(6) *A. fimbriata*, Sm.—♀, Sept. 9 and 15. ♂, Sept. 9. The male is smaller and more slender than the ♀; face wholly dark, with long yellow hair; flagellum faintly ferruginous beneath; process of labrum bifid; apex of abdomen with yellowish-white hair; pubescence of legs pale.

BOOK NOTICE.

Some Considerations on the Nature and Origin of Species.—By J. W. Tutt, F. E. S.

This is the title of the presidential address delivered before the City of London (England) Entomological and Natural History Society, December, 1897, published in a pamphlet of 20 pages. Mr. Tutt interestingly reviews the recent theories as to the causes of species formation, touching on the presence of variation in organic beings, action of natural selection, origin of local races by adaptation to differing environment, etc., and comes to the conclusion that all generic and specific characters are due to the past or present action of natural selection. Comparatively fresh points are made in that specialization of genital organs does not necessarily accompany other specialization, and that isolation may be brought about by difference in time of emergence, difference in habit or in the hours of mating, as well as by geographical conditions.

Mr. Tutt does not believe that climate, food, sexual selection (in insects at least), isolation or laws of growth can produce specific characters; all such must be utilitarian. This is the position so ably defended by Wallace, but nevertheless certainly untenable.

The reviewer would refer Mr. Tutt to the case of Datana, where all the specific characters seem so evidently due to the action of isolation alone, as most recently lucidly explained by Romanes. In this case the isolation is due principally to different food plants.

Harrison G. Dyar.

Mailed April 1st, 1898.

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Fig. 1, Deva (?) ornata ; 2, Basilodes Howardi ; 3, B. territans, male ; 4, B. territans, female ; 5, Kallitrichia albavena ; 6, K. pendula ; 7, K. sagittalba.

[NOTE.—The colouring is merely approximate ;. all, except No, 2, having practically white secondaries, with dusky shadows.]

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METALLIC SPECIES OF BASILODES AND NEW SPECIES OF ALLIED GENERA.

BY R. OTTOLENGUI, NEW YORK.

Among the Basilodes there are three closely allied species of very similar pattern, the fore wings being mainly solid metallic golden. These are territans, Hy. Edw., Howardi, Hy. Edw., and Arizonæ, French; Howardi and Arizonæ having been described as Plusias. The most casual examination of the front of Howardi separates it structurally from Plusia and places it with Basilodes. Arizonæ I have not seen, the only specimen known to me being the "type" in the collection of Prof. French. I, however, sent a male and female of territans to Prof. French for comparison with his "type," thinking that Edwards might have redescribed French's species. From Prof. French's reply, together with a photograph of the type which he kindly had made for me, I have little doubt that his species is a Basilodes, unless, indeed, it may belong to an allied, undescribed genus of which I have to write.

The following notes may aid in identifying these three species :

Basilodes territans, Hy. Edw.—Edwards described this by comparison with Howardi, but fails to note two differences, probably because his single type of Howardi is in indifferent condition. He speaks of two spots along the costa. This is clearly discernible in the female (see plate, fig. 4), but the male is slightly different. The ground colour persists along the median vein as far as the cell, thus dividing the metallic area and isolating a long narrow metallic spot between the costa and the vein (see plate, fig. 3.) Moreover, in territans the metallic colouring reaches quite to the fringes all along the outer margin, whilst in Howardi at the centre of the outer margin the ground colour shows as a semi-lunar blotch. This is more distinct in the female (Howardi) than in the male. In territans the secondaries of the male are clear white, while in the female a dusky shade shows along the costa and outer margin. Male expands 33 mm. ; the female 35 mm. My specimens agree with the types in the Neumöegen collection.

Basilodes Howardi.—I have not seen the description, but it was made from a single specimen. It is worth recording, therefore, that both sexes are alike except in size. The male expands 35 mm., and the female 37 mm. These measurements might lead one to imagine that Howardi is but little larger than territans, which would be a gross error, Howardi being a much more robust insect, with wings much broader in proportion to their length than in territans. Both sexes have uniformly brownish secondaries. My specimens agree with the type in the Edwards collection. (Plate, fig. 2.)

Basilodes Arizonæ, French.—Of this Prof. French writes to me: "Your two specimens (territans) have the same general colour as Arizonæ, but the markings are different. Arizonæ has the posterior margin of the fore wings longer in proportion. The type of Arizonæ has a patch at posterior angle (purplish-brown), and one on the middle of the posterior margin." The original description says "hind wings whitish," but as it refers to a single male specimen, I should expect the female to show dusky margins as in territans.

Synopsis.

Metallic golden fore wings, costa and markings purplish brown.

1. Two spots along costa, metallic area reaching from the base fully to the fringes at outer margin, anal angle very rounded, secondaries white with dusky border, female; or, same with median vein showing brownish and secondaries pure white, male..... *territans.*
2. As above, additional spots at anal angle and centre of posterior margin, anal angle less rounded..... *Arizonæ.*
3. Metallic area cut near the base, large triangular brownish blotch along the costa, another at the base along the posterior margin, and a smaller blotch at centre of outer margin; secondaries brownish, anal angle not rounded..... *Howardi.*

Deva ornata, nov. spec.—(See plate, fig. 1.) Head, antennæ, palpi and thorax dull yellowish-brown. Primaries brilliant metallic golden. Pattern exactly as in *Basilodes Howardi*, except that the metallic area reaches the fringes all along the outer margin. The costa is pale yellowish-brown, except at the apex, where the metallic colouring persists. An irregular triangular blotch depends from the costa, in the centre of which the reniform is plainly visible, outlined by a darker brown line, a line of similar colour crossing the blotch obliquely between the reniform

and the apex. The reniform within the brown outline is of a deeper shade than the surrounding field, and by close examination seems to show a few metallic scales. The metallic colouring is cut near the base by the t. a. line which connects the costa with a triangular blotch at the inner margin near the base as in *Basilodes Howardi.* In the proper light the t. p. line appears as a series of faint dots, invisible when the light is reflected by the metallic scales. Fringes full, alternating two shades of light brown, and divided by a fine line which parallels the outer margin, making the fringes seem double. Secondaries clear white (satiny), a hair line of brown at the extreme outer margin. Described from one specimen labeled "Hot Springs, N. Mexico, 7,000 ft. Alt." Type, male, No. 25975, National Museum, Washington. Expands 31 mm.

I must at once declare that this species is not a Deva at all, but is probably an undescribed genus, near Basilodes. I cannot risk a description of a genus, however, on account of the condition of the under side of the insect, which is badly smeared with glue. The structure of the front, however, with its long palpi, removes it from Basilodes, although I found it in the Museum collection labeled *Basilodes Howardi*, which it so closely resembles. It may rest tentatively with Deva until found again.

Kallitrichia, gen. nov. (κάλλος, τρίχες, having beautiful hair).—Antennæ simple, slightly serrate, laterally compressed. Clypeus slightly roughened, no tubercle, rounded. Palpi oblique, short, very slightly exceeding the front; first and second joints subequal, third joint half the length of the second; smoothly haired. Eyes naked. Tongue moderate. Thorax smooth. Vestiture short, hairs with a few scales intermingled. Legs: tibiæ without spines, anterior tibiæ with claw at tip. Abdomen smooth. Primaries, costa straight, wing triangular. Secondaries full and rounded.

Kallitrichia albavena, spec. nov. — Antennæ brown (white at base and perhaps throughout in fresh specimens). Head, thorax and body white. Primaries metallic green (pale pea green). Costa shows as a rigidly straight heavy white line, uniting at the apex with the white fringes, which in turn join a fine white line which borders the inner margin. Median vein white along the outer half (and perhaps throughout in some specimens, there being a faint indication of such a tendency in the specimen before me). Secondaries pure white (satiny). Described from one female which expands 30 mm. Habitat, Arizona. Type in collection of the author. (Plate, fig. 5.)

Kallitrichia pendula, spec. nov.—Similar to the last, except that all the white markings here are dusky, only a few scattering pure white scales appearing. The costal mark is not so rigid along the inner edge. The white median vein of *albavena* disappears, and in the region of the reniform we have a pendulum-shaped spot hanging from the costa. secondaries dusky. (Plate, fig. 6.)

Described from one specimen, male, which expands 30 mm. Habitat, Arizona. Type in collection of the author.

It should be noted that in this species the costa is not so rigidly straight as in the last, being slightly bent near the base. When other specimens of this are found, I should not be surprised to find in some specimens that the median vein would show brownish, separating the metallic area, as was noted in the male of *Basilodes territans*.

Kallitrichia sagittalba, spec., nov.— (Plate, fig. 7.) Antennæ brownish. Head, thorax and body white. (I have called the bodies of these three species white, because what scales seem fresh are white, but as the bodies are in poor condition and somewhat greased, when fresh they may be brownish.) Primaries: solid metallic pea green. A wide white band occupies the costa, continuing as a narrow white band all along the outer margin and around the angle, where it is gradually lost. The outer terminals of three veins reach the outer margin as faint white lines. The upper of these extends from the costal band, and thus encloses a bit of the metallic colouring near the apex. The other two are the points of a prominent white sagittate mark which occupies the centre of the wing. Fringes full and white. Secondaries dusky, more so in the female. Male expands 25 mm.; female, 28 mm. Habitat, Arizona. Types, male and female, in collection of the author.

OBITUARY.

On the 18th of February, Mr. Johnson Pettit died at Buffalo, N. Y., and was buried a few days later at Grimsby, Ont. For many years Mr. Pettit was a most diligent and successful collector of Coleoptera in the neighbourhood of Grimsby, and was well known amongst Entomologists both in this country and the United States. After forming a very complete collection of the beetles of Ontario, so far as known at that time, he gave up the pursuit and turned his attention to Geology. Subsequently he sold his cabinet of insects to the Entomological Society of Ontario, at a nominal price, in order that it might be kept in a place of safety and preserved from destruction. His work was characterized by remarkable neatness and painstaking accuracy.

A NEW ORCHARD PEST—THE FRINGED-WING APPLE-BUD MOTH (NOTHRIS? MALIGEMMELLA, n. sp.).

BY J. M. STEDMAN, PROFESSOR OF ENTOMOLOGY, UNIVERSITY OF MISSOURI.

GENERAL REMARKS.

While experimenting two years ago with the Leaf Crumpler and the Leaf Folder, a gentleman asked me to visit his apple orchard, some two miles distant, and to observe the destructive work of what he supposed was the Leaf Folder. The orchard had been in bearing for several years and covered sixty acres. The apple trees had at that time just shed their blooms (petals) and the adjacent orchards appeared green, while the infested one was very conspicuous, appearing as if a fire had swept through it.

On entering the orchard it was seen at a glance the injury was not caused by the Leaf Folder, but by a bud moth, which I at once concluded must be the Eastern Bud Moth (*Tmetocera ocellana*). However, as soon as I saw the larvæ that were doing the work, I observed that we had to deal with an entirely different species of insect, one which I had not observed or read of, and yet one that was doing a vast amount of damage, for the entire orchard was not only losing its prospective heavy crop of fruit, but also a large per cent. of the developing leaves and shoots, and as a consequence, the prospects for next year's fruit buds.

THE DISTRIBUTION OF THIS INSECT.

From inquiry, it seems this pest first made its appearance in one corner of the apple orchard two years previously, and since that time had multiplied to such an extent as to not only cover this orchard, but had spread into the edge of two adjacent apple orchards, but not into an adjacent pear orchard. The moth had its own way in this orchard, however, since the party owning it did not up to that time believe in spraying, and this enabled nature to take her course; while in most commercial orchards the pest might not have multiplied so rapidly owing to the sprayings applied for other insects.

Thus far we have seen this moth only in the apple orchards in Jackson County, although several fruit-growers have lately reported its presence in their apple orchards in other western counties of this State, but they have not as yet sent specimens for identification.*

*Since the above was written I have been reliably informed that this insect has been doing considerable damage in Kansas for the past three years.

Although we have not been able to determine, as yet, either the original locality from which this moth came, or the original food plant, it is not improbable that this insect has but lately taken to the apple, and that it existed and may now exist as an obscure insect feeding on some wild and uncultivated plant.

THE APPEARANCE AND DESCRIPTION OF THIS PEST.

The egg is very small, being only 0.6 mm.* in length, and 0.35 mm. in breadth, and is, therefore, apt to escape notice. It is of a uniform light yellow colour, oval in shape, with the surface thrown into small shallow depressions and elevations, which become larger and deeper at one end, in the centre of which there is a protuberance or very short peduncle. One of these eggs is shown in figure 8, greatly enlarged.

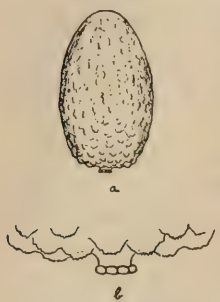

Fig. 8.—Egg of Fringed-Wing Apple-Bud Moth, Nothris? maligemmella—greatly enlarged; a, entire egg—X 30 Diam.; b, one end of same still more enlarged. (Original.)

The larva is also very small when first hatched, being less than 1 mm. in length. It is at first of a light yellow colour, with the head shining black, and the shield on the dorsal part of the first thoracic segment of a seal brown colour; the body is sparsely clothed with short light-coloured hairs arising from slight elevations, some of which have a darker coloured centre; the three pairs of true legs are brown, while the five pairs of pro-legs are of the same colour as the body, and are borne by the sixth, seventh, eighth, ninth, and last segments. As the larvæ become a little larger, the above characters remain the same except that the shield on the dorsal part of the first thoracic segment soon becomes shining black like the head, and the general colour of the body becomes more of a light greenish-yellow colour, due largely to the transparency of the body allowing the intestine, which is filled with green food, to show through somewhat. These characters

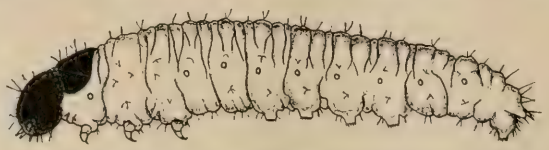

Fig. 9.—Larva of Fringed-Wing Apple-Bud Moth, Nothris? maligemmella—greatly enlarged—X 12 Diam. (Original.)

*There are about 25 mm. to an inch.

are now retained until the larva is nearly full-grown, when the colour of the true legs and of the head and shield become lighter and finally of the same colour as the general body. The full-grown larva is about 8 mm. in length. Figure 9 represents a larva 6 mm. in length, greatly enlarged, and will give one a good idea of the appearance of the larvæ of this moth throughout the greater portion of their existence. They are very conspicuous with their light greenish-yellow bodies and glossy black heads and shields.

The pupa, which stage is passed within a thin, white, silken cocoon, is 5.5 mm. in length and 2 mm. in width; of a uniform brown colour, and with a row of small, almost round depressions along each side of the sutures between the last five abdominal segments, and with indications of depressions in the form of markings along the sides of the other abdominal sutures. Figure 10 represents a lateral view of one of these pupæ greatly enlarged.

Fig. 10—Pupa of Fringed-Wing Apple-Bud Moth, Nothris? maligemmella—much enlarged—X 7 Diam. (Original.)

The adult is represented natural size in the photograph in figure 11, while figure 12 represents a photograph of this same moth enlarged. Since this moth belongs to the group Tineina of the small moths known as Micro-Lepidoptera, and since I had failed to find a description of this species in the literature at our command, a specimen was forwarded for determination to Dr. L. O. Howard, of the Entomological Division of the United States Department of Agriculture, Washington, D. C. Dr. Howard reported that the species could not be found in the National Museum collection. Therefore, since only two entomologists in the United States have made a specialty of this group of insects, and since Miss Mary E. Murtfeldt, Kirkwood, Mo., has perhaps done more work in this group than the other entomologist, I sent her two adult moths and asked her to name this species, and if it proved to be a new one to describe it. She kindly consented to do so, and as it

Fig. 11.—Adult Fringed-Wing Apple-Bud Moth, Nothris? maligemmella; natural size. (Original.)

proved to be a new species her description of the adult is as follows:

"Alar expanse 14 to 15 mm. General colour, satiny brownish-buff with slight opalescence, and more or less leaden shading on thorax, wings and body. Head buff, densely and somewhat shaggily scaled. Eyes prominent, purple-black. Antennæ two-thirds as long as wings; basal joint conspicuously long and stout; second joint also long with the inner side peculiarly excavated. Palpi (labial) long recurved with short almost concealed basal joint, long slightly thickened second joint and slender tapering terminal. Thorax broad; patagia rather large, all anteriorly bordered with leaden gray. Fore wings varying in colour from almost clear buff to buff so interspersed with the darker scales as to produce a 'smudged' effect; a small but distinct black discal dot and a group of five smaller, less clearly defined ones at the base of the terminal third, constitute the ornamentation. Hind wings rather broad, somewhat paler and more lustrous than the primaries. Fringes concolorous with wing surface, also varying in intensity of the dark shadings. Body, yellowish gray with bright buff anal tuft. Legs agreeing in colour with under surface, tibia especially of hinder pair, densely clothed with long but appressed hairs.

Fig. 12.—Adult Fringed-Wing Apple-Bud Moth, Nothris? maligemmella; enlarged—X 3 Diam. (Original.)

"Described from two males, one perfect, the other somewhat mutilated.

"The generic location of this insect is provisional, merely. In pterogastic and palpal characters it agrees quite closely with some of the Gelechiidæ, but even from these the venation presents some differences, while the structure of the antennæ renders the erection of a new genus probable, when a more liberal supply of specimens admits of closer microscopic study of the separate organs."

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, NEW YORK, N. Y.

PALEACRITA LONGICILIATA, n. sp.

Expands 26 mm. Palpi dark fuscous; front very broad, dark fuscous, slightly tufted; antennæ fuscous gray, subpectinate, the fascicles of hairs fine, silky, very long, some six to ten times diameter of stem; thorax dark fuscous gray; abdomen dark fuscous. Fore wings, costa strongly arched, apex quite pointed, inner angle rounded, whole wing narrow and lanceolate; colour light fuscous, generally washed over with dark fuscous, with numerous black atoms, especially on the veins, making them linearly blackish; also apically and in small indistinct shadings across the wing light gray, also light gray shading at ends of veins at margin; marginal points intervenular, blackish; fringe long; fuscous gray, and light gray; hind wings even fuscous, veins darker; fringe long, dark fuscous. Beneath even fuscous on all wings about colour of hind wings above, veins darker, the fore wings with a sprinkling of dark fuscous atoms.

Palo Alto, Cal.; from Dr. Barnes.

P. SPECIOSA, n. sp.

Expands 32 mm. Palpi black, front thorax and abdomen dark fuscous, the thorax with some black scales intermixed, the abdomen a shade lighter fuscous. Fore wings whitish-gray, with five somewhat diffuse cross lines made up of black scales not very solid, the first, subbasal, bent outward at cell; the second, just within middle, bent at costal vein, and darkest costally, thence straight across wing; the third, just beyond the black discal spot, not very distinct, except at costa, where it is distinct and black, forming the inner edge of a large suboval white spot which reaches to apex; the fourth line, broad, diffuse, subdentate, reaching to the apical spot; outer line diffuse, indistinctly dentate, following the apical spot on outer margin nearly to apex, becoming there distinct, heavy, black; between fourth and fifth, and also fifth and margin, the whitish-gray shows in a dentate or subdentate band; margin black, the black broader between veins, fringe fuscous. Hind wings light fuscous, veins more or less darker. Beneath light, smooth, fuscous, the lines of fore wing faintly shadowed, especially at costa and apex; submarginal space brokenly darker, marginal line blackish.

Glenwood Springs, Colo., May 3; from Dr. Barnes.

EUDULE HYALINA, n. sp.

This insect is of the size and shape of *E. unicolor*, Robs., from Texas, but, instead of being of its colour, is of the light straw colour of *E. mendica*, Wlk. It is apparently more hyaline than its congeners, and is very frail in its appearance. The wings are evenly unicolorous.

Senator, Ariz; from Dr. Kunze. Taken September 9th, 1896.

TEPHROCLYSTIS BOREALIS, n. sp.

Expands 16 mm. Palpi fuscous, slightly ochreous; front thorax and abdomen smooth silky fuscous, with a bluish tint. Fore wings fuscous, with cross lines fine, faint, the basal rounded, wavy, geminate, the middle wavy; the outer heaviest towards and at costa, starting straight out at costa to vein 8 just beyond cell, following it towards base the distance of the angle from costa, then turning at an angle, almost a right angle, through discal spot straight, or nearly so, to inner margin. Hind wings fuscous, even, with wavy lines very faintly showing. Beneath fuscous, darker at costa on fore wings, and with hind wings darkened and lightened into 6 or 7 rounded parallel shadings.

Winnipeg, Manitoba; from Mr. Hanham.

TEPHROCLYSTIS LATIPENNIS, n. sp.

Expands 16–18 mm. Palpi long, porrect, heavily scaled, black and fuscous mixed; front somewhat tufted, fuscous or blackish gray; thorax fuscous gray; abdomen fuscous-gray to gray, segments sometimes tinged with brownish. Fore wings broad, gray to fuscous-gray, overlaid more or less with blackish, forming an extra basal, and marginal broad darker bands; cross lines light, geminate, wavy; one basal, the second within the prominent black discal spots, the outer extradiscal, the outer considerably bent below cell and often lined with black within; a faint submarginal zigzag line, a marginal row of black dashes separated at end of veins. Hind wings broad, rounded, of same colour as fore wings, the basal and middle lines slightly indicated, the outer geminate, quite distinct, bent considerably at middle, wavy, margin darker; a marginal black line; discal points black, distinct. Beneath as above, the fore wings with markings more faint, the hind wings very nearly as above.

Quebec, Canada; from Mr. Hanham.

TEPHROCLYSTIS SUBCOLORATA, n. sp.

Expands 20–23 mm. Palpi and head clear blackish; thorax blackish-gray; abdomen blackish-fuscous. Fore wings gray, overlaid with blackish; the wings narrow extended, the lines quite distinct; basal line

geminate, bent, wavy ; median lines three, bent at discal spot, the middle one running through this, then bent outward at lower side of cell, curving thence around to inner margin ; outer line quite broad, of the ground colour, with a fine central black line, and edged on both sides with blackish, bent around from costa to vein 6, then parallel with outer margin ; discal spots large, oval, jet black. Hind wings with much less black, with two outer rounded blackish lines, and black discal spots ; beneath gray, fore wings with a distinct, rounded, black, outer, rather broad line, black discal spot, blackish apex and outer margin, a blackish dot along costa near discal spot, and a blackish submarginal line ; hind wings with outer line distinct, black, a submarginal fine line, black margin, and black discal spot. The markings below vary in distinctness, but are generally sharp and clear.

Arizona, without other location ; also from San Francisco mountains. From Dr. Kunze. The latter taken July 20th, 1897.

TEPHROCLYSTIS NIVEIFASCIA, n. sp.

Expands 18 mm. Palpi rather long, somewhat heavy, blackish ; front tufted, blackish ; summit fuscous, or whitish fuscous ; thorax fuscous gray ; abdomen fuscous, with whitish markings dorsally on each segment; fore wings white, with black or blackish-fuscous running into wavy cross lines, mostly indeterminate and more emphasized on veins, these lighter, finer and more distinct just beyond discal spot forming a light shading in a broad white or whitish band, bent out beyond cell, and somewhat angulate below costa ; outer field blackish, with fine, wavy, indistinct, whitish line. Hind wings whitish, with fuscous or black shadings, deeper and suggesting wavy lines outwardly and along inner margin ; discal spots on fore wings prominent, jet black, on hind wings black but less prominent ; beneath lighter, smoother, the general colours above reproduced with less fuscous shading among the black ; discal spots black, distinct.

Santa Fe, N. Mex.; from Mr. Cockerell. Oregon. The latter type in National Museum collection; this being more fuscous in its shadings. Museum type No. 3920.

TEPHROCLYSTIS ACUTIPENNIS, n. sp.

Expands 26 mm. Palpi short, fuscous ; front light fuscous gray ; collar black ; thorax fuscous, with a reddish shade ; abdomen light fuscous, gray dorsally, with fine black cross line at base, and a white cross line on second segment ; fore wings long, acute, fuscous, with

darker fuscous shadings running into lines, more distinct on outer half and running subparallel with outer margin, slightly wavy, merging together towards apex and reaching outer margin below apex, the inner one separating, and going to costa with a sharp angle at veins 7 and 8; discal vein lighter, preceded from base half way out with a line of black spots; a line of black spots on subdiscal, on outer cell; and beyond cell below vein 9, these latter becoming merged into a black line; a darker shading at middle of inner margin, and near dorsal angle; the whole wing with a faint brownish shading; discal spots black. Hind wings whitish, fuscous stained, marked with blackish on inner margin; marginal line black; discal spots black; beneath lighter fuscous, smooth, quite even; on fore wings a blackish outer line, angulate below costa, very indistinct, and a corresponding median line on hind wings; discal spots evident, black.

Los Angeles Co., Calif. Type in National Museum collection, No. 3954.

TEPHROCLYSTIS PERFUSCA, n. sp.

Expands 23–26 mm. Palpi moderate, porrect, end deflexed, fuscous, black on end; front fuscous, summit lighter; thorax fuscous; abdomen blackish-fuscous; all wings broad, rounded, of an even fuscous colour, squamose in appearance, faintly shaded into indeterminate wavy lines, with scattered blackish atoms, more prominent on costal space; discal spots faint; marginal lines blackish; beneath smoother fuscous, with blackish shade at apex of fore wings, and two rows of faint blackish points on hind wings; discal spots faint, marginal lines darker, broken on fore wings.

Easton, Washington; from Dr. Riley. Utah; taken in June. The latter type in National Museum collection, No. 3919.

EUCYMATOGE GILLETTEI, n. sp.

Expands 30 mm. Palpi moderate, stout, black; front tufted, black; thorax gray; abdomen fuscous gray. Fore wings slate gray with a fuscous tinge, thickly peppered with black scales; basal line black, fine, not distinct, bent at middle; outer line subparallel with outer margin, scalloped, the points on the veins pointing inward; all veins brokenly lined with black; a black marginal line; discal spot black, not very distinct; hind wings gray; darker outwardly, four or five parallel blackish lines showing along inner margin half way across the wing; margin

somewhat wavy, with a fine black line; discal spot small, black. Beneath light fuscous; outer line showing faintly on fore wings, and a faint rather broad line at middle of hind wings.

Colorado; from Dr. Gillette.

MESOLEUCA ABACTA, n. sp.

Expands 34–36 mm. Palpi not heavy, moderately long, erect, almost recurved, blackish; front thorax and abdomen fuscous, more or less stained with ochre; abdomen tufted at end; fore wings broad, light gray, more or less striated crosswise with blackish; basal line fine, distinct, some angled at middle, sharply black; one-third out another black line, turned outward from costa, sharply angled on cell, thence running broadly and heavily nearly straight to inner margin; this is followed by a finer, almost parallel line, which is somewhat broken on posterior half, a faint, much broken black line just beyond discal spot, and beyond that a quite heavy black line angled outward between 3 and 4, broken posteriorly; a clear black rounded spot costally at apex; marginal line black; discal spots prominent, black, well out on wing. Hind wings fuscous, lighter basally, becoming darker and with faint shadowy darker lines towards outer margin and parallel with it; beneath fuscous, much the colour of hind wings above, the fore wings becoming darker along costa and towards apex.

Arizona; one of the types is in National Museum, No. 3924.

HYDRIOMENA PERNOTATA, n. sp.

Expands 34 mm. Palpi rather short, sordid fuscous; front of same colour; thorax fuscous gray, with black edging to patagiæ; thorax dark fuscous, black dorsally, lighter fuscous posteriorly on segments; fore wings rather long, grayish fuscous, broken up with irregular black spots; these on the basal half very irregular, so that the lines of which they are the evidences are entirely indeterminate; a whitish fuscous band beyond discal spot, edged outwardly with a geminate broken, dentate, wavy, and angled black line running in general direction, parallel with outer margin; a submarginal incomplete row of black dashes, the space having a bluish stain. Hind wings light fuscous with an ochre reddish stain outwardly, marginal line black, finely broken on all wings; beneath rather deep broken fuscous, becoming a large blackish spot towards apex; hind wings as above, but much darker; the fore wings are also considerably ochre stained.

Fort Wrangel, Alaska.

HYDRIOMENA OCCIDENS, n. sp.

Expands 30 mm. Palpi short, fuscous; front gray; thorax light gray, intermixed with black, becoming white at middle above, and with black edge behind; abdomen gray, mixed with black, segments white lined posteriorly; fore wings white with shadings of fuscous generally evenly distributed, emphasized somewhat on veins, forming wavy, very indefinite lines, and giving a general mottled appearance. The veins are marked with fine clear black, broken into dashes of even or nearly even lengths, these showing very sharply on posterior and outer portions; marginal line black broken; costa more broken in colour than rest of wing; a rounded broken black line close to base; hind wings white with fuscous tinge; discal spots fine, black; margin black, broken; beneath light fuscous, broken into shadings. On fore wings an outer broken band of blackish spots, and one or two spots indicating another on hind wings.

Oregon. Type in National Museum, No. 3922. Another specimen in my own collection.

HYDRIOMENA GRANDIOSA, n. sp.

Expands 36 mm. Palpi moderate, blackish fuscous; front fuscous; thorax fuscous gray, marked with reddish on anterior part and on posterior tufting; abdomen light gray in front, more blackish posteriorly, segments whitish lined, with more or less of reddish dorsally; fore wings strongly pointed at apex, with posterior angle stronger than usual, marked with dentate wavy even bands, subparallel to each other and outer margin; the middle rather broader, inclosing discal spot, whitish, those on either side of it darker than the rest of wing; three more basally, the middle one somewhat darker than the two others; the whole wing with more or less of reddish, more especially evident on outer dark band and outer space; a submarginal row of black points on veins; marginal line black, broken somewhat, wavy; fringe interlined; hind wings whitish, fuscous stained two faint median lines, outer shadings and black wavy marginal line; beneath even fuscous, two lines showing on all wings beyond black discal points, on hind wing the outer emphasized with black points on veins.

Fort Yuma, Ariz., April 4th. Belonging near *H. neo-mexicana*, Hulst. Type in National Museum at Washington, D. C., No. 3927. Another specimen taken at light in April is smaller, somewhat darker, and without reddish on fore wings.

ERSEPHILA INDISTINCTA, n. sp.

Expands 35–40 mm. Some time since, Trans. Am. Ento. Soc., Vol. XXIII., p. 291, I described *Ersephila grandipennis*. I am convinced I have two species under that name, and now separate them, calling one of the forms *E. indistincta*. The two species approach each other very closely, but *E. indistincta* is smaller as a rule, and has the darker colour of the wings forming into two bands, one basal and the other beyond the cell, both quite even in width. *E. grandipennis* is much more diffuse, the bands not shown, the cross lines more angulated, and the lines themselves more distinctly outlined. *E. indistincta* has the antennæ of the ♂ more distinctly bipectinate than *E. grandipennis*, and the wings are generally somewhat tinged with browish.

The specimens of *E. indistincta* are from Colorado and Washington ; those of *E. grandipennis* from Colorado only.

XANTHORHOE GLACIALIS, n. sp.

Expands 34–36 mm. Very much resembling *X. nemorella*, Hulst, and quite possibly a variation of that northern species. The ground colour of the fore wings is, however, ochreous stained with fuscous, the cross band is broader, especially at inner margin, and the outer edge, with a large angle strongly projected outward at space between veins 4 and 5, and there is a submarginal row of fuscous spots somewhat triangular in shape, and intervenular in position. There is a faintly showing broad central band on hind wings. Below dull ochreous, with the lines bordering bands showing distinctly on all wings.

Alaska. The Museum type number is 3925.

XANTHORHOE LONGULA, n. sp.

Expands 34–36 mm. Close to *X. glacialis*, Hulst. Fore wings pointed, even light ochre, or buff ochre with the colour deepening into a faint broad central band with faint ochre shadings and fine lighter cross lines, the band reaching out more prominently between 3 and 4, and between 4 and 5 ; the apex and margin somewhat fuscous stained, and a blackish marginal line. Hind wings fuscous ochre, or becoming bright ochre outwardly. Beneath almost even, light fuscous ochre varying to more or less ochre.

" Berring Island." My specimens are females, but the relationship seems to be so close to *X. glacialis*, Hulst, that I have little doubt as to generic oneness. I would not be at all surprised if they were ascertained finally to be variations of one species. The Museum type number 3926.

MONOTAXIS, n. gen.

Palpi moderate, porrect, end member very small; tongue strong; front scaled, quadrate, slightly protuberant; thorax and abdomen untufted; fore tibiæ unarmed; hind tibiæ with two pairs of spurs, not swollen, without hair pencil in ♂; antennæ unipectinate in ♂, pectinations long, end simple, in ♀ unidentate; fore wings even, rounded, without fovea in ♂ below, 2 accessory cells, 12 veins, 3 and 4 widely separate, 5 near middle of cell, 6 at a point with 7 at end of cell; hind wings 8 veins, without fovea, vein 5 near middle of cell, 6 and 7 stemmed, 8 joined with cell nearly its whole length.

So far as I know the first American Geometer with unipectinate antennæ, though these are found in the Australian regions. But there the form with 8 joining the cell in hind wings is extremely rare. I do not consider it in anywise but as one of the *Hydriomenidæ*, though it may be placed in a subfamily by itself.

MONOTAXIS SEMIPECTINATA, n. sp.

Expands 35–40 mm. Palpi and front dull black; thorax dark mouse colour; abdomen lighter; fore wings of a quite even dark fuscous, with a mouse colour tinge, this deepening into a rather broad median band, faintly indicating parallel wavy lines; beyond this, first a white and then four dark lines are indicated by fine dots of these colours on veins; an outer faint whitish line, mostly evident between veins, wavy; marginal line broken, blackish; discal spots faint; hind wings even mouse colour fuscous, deepening outwardly. In the ♀ all the colours are the same, but lighter fuscous, and without the mouse colour shading, but the single specimen has an appearance as if faded. Beneath even mouse colour fuscous, blackish on basal half along costa on fore wings, with some ochre tinging near apex; ♀ lighter. The whole insect has much the markings of *Philereme californiata*, Pack., and much the colour of that species with the mouse colour shading added.

Fort Grant, Ariz., July 23. In National Museum, No. 3928. The female in my own collection from Arizona without definite locality, but probably from either Prescott or Phœnix.

MYCTEROPHORA SLOSSONIÆ, n. sp.

Expands 24 mm. Palpi black and fuscous mixed, nearly black towards end; front black tufted; thorax fuscous ochre, mixed with black in front, blackish behind; abdomen blackish, interlined with fuscous; fore wings fuscous gray to fuscous, with a slight ochre tinge more or less

heavily overlaid with black; the ground colour shows in a broad costal band, reaching nearly to apex, and extending posteriorly to cell; the extreme edge of costa being checkered with blackish; the whole space of the wing covered with blackish has the fuscous ground colour showing more or less distinctly in numerous scalloped parallel lines, a basal, extra discal, and outer being more especially distinct; a scalloped marginal line, black; hind wings corresponding in colours and lines with fore wings, the discal line forming a row of dentate black lunules; beneath in general appearance as above, the lines less distinct or obsolete, the blackish emphasized in a middle and outer rather broad band.

White Mountains, N. H.; from Mrs. Slosson. Winnipeg, Man.; from Mr. Hanham. The insect has superficially the appearance of a small *Homoptera*.

SYNELYS NIGROCANDIDA, n. sp.

Expands 25 mm. Palpi and front black; summit pure white; collar narrowly blackish; antennæ white, somewhat blackish stained above, especially towards end; thorax pure white; abdomen white, faintly stained with blackish. Wings pure snow white; fore wings with black specks at cell and at inner margin, suggesting a basal line; outer line well out, fine, jet black, much waved and angled, obsolete at costa; beyond this on posterior half, jet black scales forming four incomplete black spots; hind wings without basal line; outer line corresponding to line on fore wings with corresponding submarginal black scales and dots; discal spots distinct, jet black on all wings; margin with jet black intervenular points; hind wings with black scales along inner margin. Front wings rounded; hind wings slightly wavy, scarcely angled. Beneath dull white; a row of black points on veins in place of outer lines, these more faint on hind wings; discal joints and margin as above, not so distinct on hind wings.

Ormond, Florida; from Mrs. Slosson. A very pretty insect with sharply contrasting black and white, much suggesting *S. alabastaria*, Hubn., but slighter, with colours more vivid, and hind wings less angled. I have seen the ♀ only.

ROYAL SOCIETY OF CANADA.—The seventeenth general meeting of this Society will be held at Ottawa, in the Normal School Building, on the 25th of May, beginning at 10 o'clock a. m. The Presidential address by the Hon. F. G. Marchand, Prime Minister of Quebec, will be delivered that evening. Mr. J. D. Evans, of Trenton, is the delegate from the Entomological Society of Ontario.

NOTES ON SOME ONTARIO ACRIDIIDÆ.

BY E. M. WALKER, TORONTO.

As so little is known of the Orthoptera of Canada, the following notes on the species of Acridiidæ, which I have taken in Ontario, may prove of some value. They are by no means intended to form a complete list of the species found in Ontario, but only of those which have come under my own observation.

The great majority of my specimens were taken from but two localities—Toronto, and the vicinity of DeGrassi Pt., Lake Simcoe, about fifty miles farther north. Although so near each other, the entomological fauna in these two localities differs somewhat; many forms common on the Niagara peninsula and southward being found as far north as Toronto, but not extending to Lake Simcoe, while several northern forms have their southern limits, at least in Ontario, about Lake Simcoe. But although the collecting grounds in both these places are very rich and varied, there are no doubt a number of Ontario species not represented in either. The great Archæan region forming the northern and greater part of Ontario has been but little explored from an entomologist's standpoint, and possibly many interesting species occur there, while there are doubtless southern forms not yet recorded from Canada whose range extends into the Niagara peninsula.

My thanks are due to Mr. S. H. Scudder, Mr. A. P. Morse, and Mr. W. S. Blatchley for the determination of doubtful species.

I.—Tettiginæ.

1. Tettix ornatus, Say.

Acrydium ornatum, Say; Amer. Entom., 1824, I., pl. V.

Tettix ornata, Say; Scudd., Mat. Mon. of N. A. Orth., 1862, 474.

" *dorsalis*, Harr.; Ins. Inj. to Veg., 1862, 186.

" *quadrimaculata*, Harr.; loc. cit., 186.

" *bilineata*, Harr.; loc. cit., 186.

" *ornatus*, Say; Fernald, Orth. N. E., 1888, 46.

Form, *triangularis*, Scudd.

Tettix triangularis, Scudd.; Mat. Mon. N. A. Orth., 1862, 475.

This species is the commonest member of the subfamily occurring about Toronto and Lake Simcoe. It frequents the damper parts of pastures, wet ditches, etc., and is also found, especially the short-winged form, *triangularis*, in quite dry, sandy or gravelly uplands. Though generally found in the neighbourhood of woodlands, it does not seem to

penetrate into their depths, where *T. granulatus* frequently occurs. The short-winged form is generally found in drier places than the long-winged form. In fact, I do not remember ever to have taken the former in boggy places at DeGrassi Pt., although the long-winged form is quite common in such spots. On the other hand, in a certain dry, sandy pasture at DeGrassi Pt., *triangularis* is quite numerous, whereas the long-winged variety is scarcely ever met with.

My Toronto specimens were taken between April 20th and June 17th, and again in September; while those captured at Lake Simcoe were captured between August 15th and September 25th, and also a few on May 2nd, 1896.

2. Tettix granulatus, Kirby.

Acrydium granulatum, Kirby; Faun. Bor. Am. Ins., 1837, 251.
Tettix granulata, Kirby; Scudd., Mat. Mon., 1862, 474.
Tetrix ornata, Harr.; Ins. Inj., 1862, 186.
Tettix granulatus, Kirby; Fernald, Orth. N. E., 1888, 46.

Though less common than the preceding species, this form is frequently met with, and, as a rule, is found in more thickly wooded places, often a considerable distance from any clearing. It is also common on the boggy margins of slow streams, and a favourite haunt at Lake Simcoe is the swampier parts of the shore where a large amount of decayed wood collects. It is not often found in damper portions of otherwise dry pastures, where *T. ornatus* frequently abounds. It is common both at Toronto and Lake Simcoe, and also in the Muskoka district, and probably ranges a long distance northward and westward in Ontario, as I have taken it at Winnipeg, Man. I have captured full-grown specimens in every month from April till September, but mostly in April, May and August.

3. Paratettix cucullatus, Burm.

Tetrix cucullata, Burm., 1838, Handbuch, II., 658.
Tettix cucullatus, Scudd.; Fernald, Orth. N. E., 47, 1888.
Paratettix cucullatus, Morse; Psyche, Vol. VII., 163, 1894.

This species is somewhat local, though sometimes very abundant where it occurs. I have found it on the sandy margins of streams near Toronto, and it is but seldom seen away from such situations. I have never seen it at Lake Simcoe. My specimens, with one exception, were taken in the months of May and June, most of them in the latter. The exception referred to was a male taken on a wet clay bank, on February 18th, 1897, which was an unusually warm, spring-like day for the season.

4. Tettigidea parvipennis, Harr.

Tetrix parvipennis, Harr.; Ins. Inj., 1862, 187.

Tettigidea polymorpha, Burm.; Scudd., Mat. Mon., 1862, 477.

" *parvipennis*, Harr.; Morse, Psyche, VII., 1896, 324.

Form, *pennata*, Morse.

Tetrix lateralis, Say; Harr., Ins. Inj., 1862, 187.

Tettigidea lateralis, Say; Scudd., Mat. Mon., 1862, 477.

" *parvipennis pennata*, Morse; Psyche, VII., 1896, 325.

A common species in Ontario and has similar haunts to those of Tettix granulatus. The edges of roads cut through swampy woodlands are favourite resorts, but it is frequently found in other wet places. Like Tettix granulatus, it is also often found in deep woods, when these are of a more or less damp character.

The short-winged form is more often seen than the long-winged form, but both are quite common. On April 12, 1895, I found a ♀ *pennata* hibernating in a beetle-boring in a log. The hole was completely concealed by the bark.

My specimens were taken between the beginning of April and June 21, and again in August and September.

II.—Truxalinæ.

5. Chloealtis conspersa, Harris.

Locusta (Chloealtis) conspersa, Harr.; Ins. Inj., 1862, 184.

" " *abortiva*, Harr.; loc. cit., 184.

Stenobothrus melanopleurus, Scudd.; Bost. Jour. Nat. Hist., 1862, Vol. VII., 456.

Chrysochraon conspersum, Harr.; Thos., Syn. Acrid., 1873. 76.

Chloealtis conspersa, Harr.; Thos., Ninth Rep. State Ent., Ill., 1880, 99.

This species is rather common on the borders of woods in summer, the males hopping about on the dead leaves, with which their colour closely harmonizes, and the females squatting on logs and old fences upon which they deposit their eggs. Mr. C. T. Hills gave me a short stick of dead, though sound, sumac, upon the end of which he found a female in the act of boring. The hole was 16 mm. deep, but no eggs had been deposited.

It first appears in the imago state late in June, or early in July, and continues through the summer till September. In the earlier part of the

season the males seem to be more abundant than the females, but during the latter part of the season the reverse is the case.

I have two females of the full-winged form, *prima*, Morse (Psyche, VII., 1896, 420). In one specimen the tegmina project beyond the tip of the hind femora by about one-fourth their length, and the wings are quite ample; in the other they just reach the tip. Both were taken at Lake Simcoe.

I have specimens from Nepigon, Lake Superior, Aug. 27, 1897; Kingsville, Aug. 24, 1897 (C. T. Hills); Clear Lake, Peterborough Co., July 7, 1897; Toronto, and DeGrassi Pt., Lake Simcoe.

6. Orphula aequalis, Scudd.

Stenobothrus aequalis, Scudd.; Bost. Jour. Nat. Hist., 1862, Vol. VII., 459.
Stenobothrus bilineatus, Scudd.; loc. cit., 460.
Orphula aequalis, Morse; Psyche, VII., 1896, 409.

This is a very local species with us, though plentiful enough where it occurs. I have taken it in dry, sandy pastures at Toronto, and DeGrassi Pt., Lake Simcoe. The males are for the most part of the brown form, the females of the green; but the proportion seems to vary according to the locality. For instance, at DeGrassi Pt. about one-third of the males seen have more or less green in their coloration, while only very few brown females are found; whereas at Toronto the proportion of brown individuals in both sexes is much greater.

It appears in the perfect state from the latter part of July until the beginning of October.

7. Mecostethus lineatus, Scudd.*

This large, handsome insect is quite plentiful in Ontario in low, wet, sedgy meadows bordering lakes and slow streams, but is very shy and difficult to approach, and does not generally remain where it alights, but moves quickly through the reeds and sedges to another spot some distance away.

It is quite common about Lake Simcoe, less so at Toronto. I found it in great abundance on the borders of a small lake near Aurora, Ont.

It appears in the perfect state from about the middle of July until late in September.

*For Synonymy see page 55.

8. Mecostethus gracilis, Scudd.

Arcyptera gracilis, Scudd.; Bost. Jour. Nat. Hist., 1862,VII., 463.

Stetheophyma gracilis, Thos.; Syn. Acrid., 1873, 99.

This species is found in precisely the same habitats as the preceding in Ontario, but in the West, at Winnipeg, Man., I have also taken it in prairies which were quite dry. It is not a very common species here, though by no means rare.

All my specimens were taken in August, though it is probably found throughout the season in which M. lineatus occurs. I have seen it at DeGrassi Pt. and at Aurora.

9. Stenobothrus curtipennis, Harris.

Locusta (Chloealtis) curtipennis, Harr.; Ins. Inj., 1862, 184.

Stenobothrus longipennis, Scudd.; Bost. Jour. Nat. Hist., 1862, Vol. VII., 457.

Stenobothrus curtipennis, Harr.; Thos., Syn. Acrid., 1873, 91.

A very common grasshopper in low, wet meadows, clearings in swampy woods, etc. Probably found throughout the whole of or at least by far the greater part of Ontario. Both the long- and short-winged forms are common.

It comes to maturity about the first of July, or in some seasons a little later, and is found until about the beginning of October.

NOTES ON THE NOCTUID GENUS HYDRŒCIA.

BY HENRY BIRD, RYE, N. Y.

Descriptions of several *Hydræcia* larvæ have appeared in this magazine at various times, but as they were instances when the insects were infesting cultivated plants, the following notes are submitted to show their life history when found in more natural environments, and to assist the student in obtaining sufficient material in some of the species for comparative work. From the paucity of examples in collections and from the close relationship existing between most of the species, it is necessary to resort to breeding, or at least to have such a knowledge of their early habits as to secure extended series, before a very correct idea may be had of the representatives of this genus.

Since Mr. Grote worked over the group [*Hydræcia*, Guen.; *Gortyna*, Ochs.], describing as new many of the species, very little practical work has been done. He described from scanty material, and although his writings seem sufficiently lucid, the construction given some of his

species to-day points to a very mixed condition of opinions. Hence, an opportunity offers where a little light may be shed, and at the same time most interesting work afforded the student.

It is not necessary to go into all the details of the breeding cage in order to get a quantity of specimens in perfect condition. A knowledge of food plant and a few exact dates save much of this bother. *Hydræcia* larvæ bore in the stems and roots of annual and perennial plants and having once located in a plant attain their full growth and pupate in their burrows. True, they are at all times concealed, but a little experience soon enables one to locate them, and if the pupal change has occurred, a section of the plant enclosing the pupa may be removed, and can be placed in some convenient box to await the emergence of the imago. The waiting time will not overtax one either, being for the species here mentioned, a period of from fourteen to thirty days.

There seems a decided indifference to food plant expressed by the common species ; almost any thick-stemmed plant coming in their way is accepted. Possibly it is as much a case of necessity as of choice, for it seems probable that oviposition must be somewhat broadcast, at least when the annuals are infested. The female moth appearing in September certainly could not apprehend the site of an annual of the following summer, and it follows that the larvæ must in a measure look out for themselves. The characteristic points of the species here enumerated are compiled from my notes covering half a dozen years' observation. Of the other species taken in this locality my observations are less complete.

Hydræcia nitela, Gn.—This is the most familiarly known species, by reason of its wide distribution, and its larval history has been well worked out by the economic entomologists. It flies willingly to light, and is by far the commonest species that one may obtain from this source at Rye. Its food plants are numerous. The most preferred seems to be ragweed. The larva may be located by examining the plant stalk for one or more small holes through which the excrements fall to the ground, and by the presence of the latter around the base of the plant. The larvæ work upward twenty inches or more according to the size of the plant, and as occasion requires make several small holes in the stalk. If full growth is attained, a larger opening, one-quarter of an inch in diameter, will be made for the moth to escape. This is their last act before changing. Occasionally two larvæ are found in a plant. It seem very prone to parasitic attack. For convenience of comparison I give a description of

larva. Mature larva: Length, 1.6 inches; very cylindrical. Colour livid, mars brown; darkest on first four and last three segments. Head shining, brown; mandibles black, as are the true legs. On side of head is a black line which has a continuation on the thoracic shield. The latter a lighter shade of brown than the head and merges into black where it meets the line mentioned. A dirty white stripe extends along dorsum. A similar stripe on subdorsum, but is lacking on first four abdominal segments. On either side of this line on each segment are two minute black dots, and two more near each spiracle that are also black. Anal shield shining; dark brown. Begins to pupate August 16; to emerge, September 12. There seems a variation in the larva of the form *nebris*, but I am not prepared to speak with certainty concerning it at present.

Pupa is cylindrical, longer than usual compared with its diameter, varies greatly in size according to sex; the average is about .75 inch in length. Cremaster not prominent, composed of two divergent spines. Wing-cases slightly creased, moderately prominent. Colour light brown. Pupa is always found below opening for moth's emergence, frequently down at the bottom of burrow.

Hydræcia cataphracta, Grt.—In the search for larvæ here at Rye this species is everywhere found in numbers. At light the imago would be classed a rarity. Preferred food plants are burdock and thistle. Two or three specimens are often found in the former plant, as the branches, as well as the main stalk, offer sufficient substance for their work. When working in thistle but one will be found. The presence of larva in burdock can be detected quite easily by the unhealthy appearance of the plant and by the evidence at the base of stalk. When in thistle the larva keeps well up to near the top, for the plant becomes hollow from the ground up to the main branches, but is solid above. Infested plants may be detected from afar by the top part of the plant having died and fallen down to one side, the walls of the plant being so thin that the larva's work has caused a collapse of the portion above it. Pupa will be found near this break; of course, always below.

When a hole is made for the moth to escape, the inner substance is eaten away to the cuticle. When this skin that is left dries it shrinks and pulls away on one side, but still hangs as a screen against intruders.

Besides ichneumon enemies, there are other casualties that affect the mortality of this species to a considerable extent. When feeding in burdock the plant frequently dies prematurely, and becoming dried, shrinks

and pinches the chrysalis so as to kill it. In thistle the pupa is more exposed from having the stalk broken off above, and suffers from the attack of those species of ants that are always ascending plants in search of aphides.

One will frequently find in thistle, under conditions similar to those produced by *cataphracta*, a weevil, whose workings will require no little experience to distinguish from the caterpillar's by a first glance at the plant.

Mature larva: Length, 1.5 to 1.7 inches. Bodily anatomy and marking almost identical with *nitela*, but is much lighter in colour and more mottled. Is very active when disturbed in its burrow, and can go backward as rapidly as forward.

Begins to pupate Aug. 19; to emerge, Sept. 17. Pupa similar to *nitela*, but as a rule somewhat larger.

Hydræcia purpurifascia, G. & R.

Mr. Slingerland's article in CANADIAN ENTOMOLOGIST, Vol. XXIX., 161, relative to finding this species boring in cultivated Columbine, suggested to me that the wild variety might be a more natural food plant. An investigation showed my theory to be correct. But it is the root in this instance that is attacked, the plant stalk not offering a sufficient substance. The roots are surprisingly large and tuberous where the plant grows in favourable locations. The larvæ consume the inner part of the root completely, leaving only the outer skin tissue, which resembles the wrapper of a small cigar when they get through with it. These empty root skins are the only evidence one has to work upon in locating the pupa, as the plant shows no outward sign, and to find this evidence it is necessary to dig. That is all there is to it—one must dig. It is useless to mind soiled hands and frequent disappointments; if proof against poison ivy, it is a large factor in one's favour. Having once located a larva, the surrounding leaf mould must be examined carefully, as they seldom pupate in their burrows, and if the search has been thorough you may find a pupa or you may not. The latter often in the majority. It frequently happens there have been visitors before. Ground moles are early callers after the caterpillar has transformed, and fragments of the pupa shell where they have tunnelled under a plant tell how the spoils always fall to the lot of the earliest bird. Fortunately for the collector, Columbine grows in all sorts of seams and clefts of rocks, and it is here, where the plants are inaccessible to the mole, that one may search with

profit. In one locality examined it was estimated the moles had eaten seventy-five per cent. of the pupæ, but to appreciate their skill fully one should see a place where they have been at work. It would almost seem unnecessary for any ichneumon enemies to infest this species to keep it in check, but there are a good percentage notwithstanding. Fifteen pupæ out of probably three hundred plants examined last summer, produced five hymenopterous parasites, so that at this rate one-third the number passing all other casualties are still doomed. No wonder that *purpurifascia* is rarely seen!

The description of the imago (Trans. Am. Ent. Soc., I., 341) is admirably drawn. Had Mr. Grote been familiar with its early history, he might have hesitated before applying a new name, or at least would have made a change in the synonymy relative to *Gortyna leucostigma*, Harris. As his opinions changed he cited *leucostigma* under *cataphracta*, *rutila* and *Harrisii*. Harris describes the entire life history of *leucostigma* (Ins. Inj. to Veg., 440), and in the sense of a superficial description it tallies with *purpurifascia* in description of larva and moth, date of emergence, and food plant, so as to leave scarcely a questionable doubt but that the two are identical. *Leucostigma* has priority, but will have to fall from being a preoccupied name in the European fauna. All this may seem of little importance with us, as it can make no change in the lists, but to the student it is essential to know just what the early writers had before them when describing.

This is shown in that so able an authority as Mr. Grote must have repeatedly puzzled over the matter in making so many changes of synonymy.

Mature larva: Length, 1.3 to 1.5 inches; very cylindrical, flesh-colour, no stripes or mottlings. Head and shield concolorous, testaceous, shining. Shield edged on side with black. There are a number of shiny black dots, placed as in the preceding species, but are a trifle more conspicuous by reason of the lighter ground colour. Anal shield prominent, black. Spiracles black, as is an accompanying row of dots. Pupates from Aug. 15 to 21; emerges, Sept. 10 to 24.

Pupa: Length, .8 inch; active, shiny, light brown. Becomes darker at hatching time, and the white spots on primaries, typical of *Hydræcia*, may be plainly seen through the pupa shell. Moderate spur at anal extremity. Under a glass this spur is seen to be made up of two separate projections. Tapers posteriorly rather more than in preceding species.

Hydræcia necopina, Grt.

The early history of this species seems never to have been worked up, and the mature insect is rarely seen in collections. It has never been taken at light or sugar during thirty years that lepidopterists have collected here. In passing it may be remarked that there has been no instance in my experience where a *Hydræcia* (from *inquæsita* to the end of the list) has been taken at sugar. The insignificant tongue would indicate a limited food supply being taken, and should offer an argument that they are not hibernators. Some years ago the insect was met in its early stages. Fifty or more pupæ have been gathered each succeeding year, but it still remains for me to see the moth in flight.

The food plant is wild sunflower (*Helianthus* ———), which grows in abundance at Rye. This plant thrives where the uplands and salt marshes meet, growing up many successive years from the same root, so that a locality once infested may be counted on to furnish examples for many seasons still to come. As this species of sunflower, which is quite close to the artichoke, grows six or seven feet high, there is ample opportunity for extended mining. The insect, however, only operates at the base of the stalk, and its work causes a gall-like excrescence to form that is about twice the diameter of the plant. This does not affect the growth, however, and one must examine for the galls, which is an easy matter in searching for this species. If the time for pupation has arrived an opening for the moth's exit will have been made. This is the caterpillar's last act preparatory to changing, and the presence or absence of this exit aperture, if after the time pupal change should occur, indicates whether you are dealing with a healthy or an ichneumonized example. If the larva has become a prey to some of its parasitic enemies its life will have ended before it reached full growth and no exit opening will be made. *Necopina* is a better artisan than *cataphracta* in hanging a protective lid at the exit door. This opening has to be of good proportions, and the larva eats away the substance of the stalk to the epidermis, making slight perforations through the latter around the edge. The epidermis on drying shrinks and hangs hinged at the top where no perforations were made. As a matter of fact, you will seldom find this lid intact, especially if it is much after the pupal change; the reason for this being the host of visitors that seek shelter within these burrows. Those ubiquitous myriapods which pass muster under the common name "sow bug" are the most numerous. To these may be added leeches,

ants and snails. It is not unusual to find upon opening a gall that the pupa is wriggling about in a mass of myriapods to the number of thirty or more, but as they do not attack the chrysalis their presence does not seem to be especially detrimental. As *purpurifascia* has a destructive enemy in the mole, so *necopina* has a chief foe in the field mouse. The mice dexterously tear out the side of the gall, eat the pupa, and hurry on to another, going over a large territory in a single night. It is only a pupa diet that suits them. The galls are never disturbed until after the pupal change. They are experts too at their trade. I have examined scores of demolished galls, but not once was a gall broken open that did not have the exit aperture made for the moth ; in other words, never a gall that was parasitized.

Mr. Grote's description of *necopina* (Can. Ent., VIII., 25) is rather limited by reason that there is so little of pattern to dwell upon, and his material was not plentiful. All that may be added is that the transverse posterior line on primaries may be traced on fresh specimen. It is most plainly seen at the internal margin, and can be seen in some examples extending to the costa. There is a slight sexual difference in colour, the male shading more slightly olivaceous than the female. There seems to be very little difference in size between the sexes, the usual disparity so generally shown in *Hydræcia* has not been noticed in my experience with this species. *Necopina* reminds one slightly of some of the genera which follow, *Bellura*, for instance, but there is no indication of a clypeal projection. The thoracic tuft behind collar is very prominent, and when at rest is projected forward at times, reminding one of *Cucullia*. On emergence from the pupa it is, of course, of the most importance that an exit be made at once before the wings have expanded, and for some time afterwards the moth exhibits the greatest restlessness, crawling in nervous haste from one point to another, always toward the light if in darkened quarters.

Mature larva : Length, 1.7 inches, smooth and of the greasy appearance common to boring larvæ. Body thicker perceptibly in the middle, and is a more robust larva than the preceding. Colour, dirty white. Head and shields testaceous, dark at the sides. Spiracles black ; true legs dark brown, pro-legs concolorous with body. On each segment are a number of testaceous dots, larger and more conspicuous on the fourth, fifth, and last segments. Under a glass a few minute hairs may be seen. Along the dorsum beneath the skin may plainly be seen the internal

fluids pulsating through their canal, giving the appearance of a faint stripe extending the length of the body. Begins to pupate Aug. 24; to emerge, Sept. 22.

Pupa is 1.1 inches long, very active, and is able to move the anal segments to a greater angle with axis of the body than the preceding species. Slightly larger in the middle, tapering quite sharply to extremity, where the cremaster is made up of a two-pointed spur. Antennæ, eyes, and legs show out prominently; wing-cases faintly corrugated. There is a distinct prominence on front of thorax indicative of the large tuft; this is a strong specific character. Directly below, between the antennæ, is a much smaller projection, consisting of two separate points, that shows an approach to the striking clypeal armature of the *Nonagria* pupæ. Colour is brown, wing-cases a shade darker, becoming almost black at time for emergence. It is well to let a moth remain a day after hatching before mounting on the setting-board. *Necopina*, in common with the imagoes of most boring species, is prone to become greasy; in fact, this species is "up head" in this respect, oftentimes being an unsightly object before dry enough to be placed in the cabinet.

Larvæ begin to pupate Aug. 23; the first emergence out of forty pupæ was Sept. 23.

To sum up the factors for success with these species, we may sift from the foregoing notes the following:

Locate the larvæ or an infested locality, and by a reference to the dates given, a diligent search at the proper time will meet with its reward. It may be hard to get ahead of ichneumon and other insect enemies, but we can be the first *vertebrate* on the scene, which will mean a great deal in the aggregate of the specimens obtained.

A representation of this genus in any near degree to completeness will be an addition to any collection of Noctuidæ most pleasing to the owner, and doubly so if that addition is the fruit of individual labour in the field.

THE COTTONWOOD SNOW-SCALE OF NEBRASKA.

CHIONASPIS ORTHOLOBIS BRUNERI, subsp. nov.

Chionaspis ortholobis, Ckll.; Canad. Entom., 1894, pp. 189–190.

The *Chionaspis* from Nebraska, sent to me by Prof. Bruner, was named in MS. in 1894 *C. Bruneri*, but for reasons stated at the place cited the name was suppressed. Mr. R. A. Cooley, who is doing such good work in *Chionaspis*, now confirms my original opinion as to the distinctness of *Bruneri*, except that it is still an open question whether it is a good species or only a subspecies. For the present the insect may stand as above named. T. D. A. COCKERELL.

NEW SPECIES OF NORTH AMERICAN MYRMELIONIDÆ.—II.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

Brachynemurus niger, new species.

Female.—Length, 29 mm.; expanse of wings, 56 mm.; greatest width of anterior wing, 7 mm.; length of antenna, 4 mm. Black, marked on head and thorax with luteous; sparsely hairy, more distinctly so on prothorax and abdomen.

Face scarcely convex, luteous, a transverse, shining black band above which extends upward so as to cover the inter-antennal area; this band is notched below, a black line extending from the notch almost to the clypeus; on either side, between face, clypeus and inner orbit of the eye, a triangular black dot. Circumocular area mostly luteous, except along vertex, where it is piceous. Clypeus luteous, on each side anteriorly an impressed dot. Labrum transverse, rounded laterally, emarginate in front, luteous, darker on emargination where it is sparsely clothed with black hairs. Mandibles piceous, black at tips.

Maxillary palpi of moderate length, piceous, with luteous articulations; first two joints short, about as broad as long, subequal, pale; third joint a little longer than first and second together, somewhat curved; fourth joint a little shorter than third; apical joint as long as third, subcylindrical (a little enlarged before apex), black, its tip truncate, luteous.

Labial palpi much longer than maxillary, piceous, with pale luteous articulations; first joint short, about as broad as long; second joint nearly three times as long as first, curved in basal half; apical half darker, widened and flattened, concave on inner side; apical joint greatly enlarged, fusiform, clothed with black hairs, shining black on inflated portion, the sharply-pointed tip luteous; an ocellus-shaped organ* on apical third of inflated portion externally.

Maxillary palpigers† piceous, the anterior joint interrupted in the middle with luteous. Labium luteous, piceous at base. Labial palpigers luteous, each with a black semicircle. Mentum luteous, with a transverse black line or series of dots, behind which rises a long black bristle. Gula luteous.

Antennæ clavate, somewhat shorter than head and thorax, black,

*This organ is present in all American Myrmelionidæ I have seen.

†I apply this term to the angular, elevated pieces from which the maxillary palpi spring.

paler at articulations, clothed with very short dark hairs or bristles ; two basal joints piceous, margined apically with luteous ; basal joint set in a luteous ring.

Vertex elevated behind, rounded, luteous ; post-antennal area fuscous, thinly clothed with white and black hairs ; elevated portion marked by two transverse black bands, the anterior of which is narrow and shining, forming a ridge on each side, posterior band spread out each side to form two large, somewhat triangular spots, and connected with the anterior band by the black longitudinal median furrow ; behind this furrow is a median oval black spot, longitudinally divided by a faint luteous line.

Pronotum as broad as long at base, narrowed anteriorly, truncate in front, sparsely clothed with white and black hairs, especially on margins ; black, a narrow longitudinal median line, which is enlarged at the transverse furrow, and one each side, luteous. Lateral carinæ luteous. Beneath luteous, margined on each side with black.

Mesonotum black, lobes not strongly elevated ; anterior lobe with a spot each side near front margin and a longitudinal median line, luteous ; this line is interrupted before the posterior lobe, but continued upon the latter ; another longitudinal luteous line each side (probably a continuation of the spots on anterior lobe) extending to the posterior margin, which is also luteous ; a few spots of similar colour on each lateral lobe ; posterior lobe shining black, except where marked by luteous as mentioned above. Below black, marked with luteous, especially on sides ; sparsely clothed with white hairs.

Metathorax black, with luteous markings similar to those of mesothorax, but no median line on posterior lobe and fewer spots on lateral lobes ; posterior lobe not shining.

Abdomen shorter than wings, rather slender, clothed with white hairs, more thickly at base. Black ; segments (except one or two basal ones) marked on dorsum each side, in middle and at apices, with a luteous spot ; these spots are more pronounced on the apical segments.

Tip clothed with long black hairs ; below a transverse double row of coarse black spines and two short, cylindrical, brown appendages clothed with long black hairs ; a short brownish plate between the latter at their base.

Legs of moderate length, yellow, thickly sprinkled with black ; beset with many black and white spines. Posterior femora almost entirely

black. Tibiæ black at their apices, posterior ones also with a transverse black line of confluent spots externally; spurs slightly curved, a little longer than first tarsal joint, rufo-piceous. Tarsal joints black at apices, the third and fourth entirely so; claws moderately curved, a little more than half the length of last tarsal joint, rufo-piceous.

Wings hyaline; posterior margins slightly sinuate near apices. Pterostigma luteous, black on inner half; before it, several intercostals of anterior wings and a few of posterior, forked. Veins clothed with dark hairs; the costa mostly luteous, the other veins fuscous; the subcosta of both wings and median vein of anterior interrupted, between transversals, with luteous; some other veins, including transversals, also interrupted with luteous.

Anterior wings with a few apical transversals behind median vein clouded with fuscous, especially the one nearest the pterostigma; along basal portion of submedian vein a series of small fuscous spots forming an irregular, somewhat serrate line; an oblique fuscous streak, about 5 mm. to 7 mm. in length, runs from tip of submedian vein to near apex; half way between lower end of this latter streak and outer end of basal streak of submedian vein, an irregular fuscous spot; another fuscous spot or short streak runs obliquely upward from where the post-costal vein joins the hind margin; small forks near tip and hind margin fumose; posterior wings a little shorter than anterior, almost immaculate, except for a fuscous clouding on the extreme apical transversal below median vein, before pterostigma. Posterior borders of both wings fringed with dark hairs.

Type.—No. 3812, U. S National Museum. One specimen collected at Fort Grant, Arizona, July 20, 1897, by Mr. H. G. Hubbard.

This species is readily distinguishable from others of similar size, colour and wing-markings by the length and size of the labial palpi. These latter, though not as greatly lengthened as in *B. longipalpis*, are considerably more so than in any other species of this genus that I have examined.

Brachynemurus quadripunctatus, new species.

Female.—Length, 24 mm.; expanse of wings, 49 mm.; greatest width of anterior wing, 6.6 mm.; length of antenna, 5.5 mm. Luteous, marked with dark fuscous; clothed with white and some black hairs, more distinctly so on abdomen.

Face scarcely convex, luteous ; above, a pitchy-black band separating the antennæ ; this band sends a median acute prolongation from the anterior border toward the clypeus ; furrow, between face and inner orbit of the eye, fuscous. Circumocular area luteous, except along the depressed portion of the vertex. Clypeus subhexagonal, luteous, on each side anteriorly an impressed dot. Labrum transverse, rounded laterally and narrowed anteriorly, emarginate in front, luteous, a few hairs on emargination. Mandibles piceous.

Maxillary palpi luteous ; first two joints short, about as broad as long, subequal in length, the first somewhat stouter than the second ; third joint somewhat longer than the first and second together, a very little curved, enlarged at apex ; fourth joint straight, a little shorter than third ; apical joint a little longer than third, rufo-piceous (except at articulation, where it is luteous) ; truncate and notched at tip.

Labial palpi somewhat longer than maxillary, luteous ; first joint short, not quite twice as long as broad, enlarged apically ; second joint about three times as long as first, somewhat curved, strongly widened and thickened apically, sparsely clothed with dark hairs ; on inner side at apex a perceptible concavity ; apical joint about same length as second, swollen, fusiform, luteous, clothed with dark hairs ; on the outer side, surrounding the ocellus-like spot, rufo-piceous ; apex narrowed, tinged with rufous ; tip truncate, slightly notched.

Maxillary palpigers luteous, clouded with darker. Maxillæ luteous, tinged with rufous. Labium, labial palpigers, mentum and gula, luteous ; each side, next anterior portion of maxillary palpigers, a brownish area with some dark hairs.

Antennæ clavate, shorter than head and thorax ; luteous, darker apically ; clothed with very short dark bristles or hairs ; first and second antennal joints luteous, shining, a piceous spot or two at their bases. Between the antennæ posteriorly, a narrow, transverse luteous band.

Vertex elevated behind, rounded, luteous ; in front, just behind antennæ, a transverse, pitchy-black band ; in front, on elevated portion, a transverse, shining-yellow ridge ; behind this, four black dots in a transverse row.

Pronotum as broad as long at base, somewhat narrowed anteriorly, luteous ; anterior angles rounded, front margin truncate ; a longitudinal dark fuscous stripe each side near middle line ; on the outer side of each of these stripes another irregular dark fuscous stripe extending forward to

the transverse furrow; in front of each of these latter stripes, near anterior margin, a fuscous spot. Lateral carinæ luteous. Below luteous, on either side, next carinæ, a dark fuscous streak, extending nearly as far forward as the dorsal transverse furrow.

Mesonotum luteous, with anterior, posterior and lateral lobes very strongly elevated; anterior lobe with a broad, dark fuscous stripe each side near middle line; anteriorly each of these stripes extends outward, then backward along the furrow, separating anterior and lateral lobes, thus forming an inverted U-shaped marking; each lateral lobe has an elongate spot near middorsal line, and on the outer side of this an inverted "U," the ends of which nearly meet; posterior lobe with a longitudinal dark fuscous stripe each side and a rather faint median one (sometimes wanting), the posterior margin with a dark dot medially; posterior angles each marked by two longitudinal, dark fuscous stripes; a few fuscous dots at place of attachment of anterior wings. Sides and beneath luteous, marked with fuscous.

Metanotum luteous; the lobes distinctly elevated, but less so than those of mesonotum; anterior lobe with a U-shaped, dark fuscous marking; lateral lobes marked similarly to those of mesonotum; posterior lobe with an inverted, heart-shaped, dark fuscous spot; posterior angles fuscous, margined with luteous. Sides and beneath luteous, marked with fuscous.

Abdomen shorter than wings, luteous, a longitudinal median dark fuscous stripe above, narrowed or interrupted at articulations; a similar stripe bounds the dorsum each side; beneath luteous, a fuscous line each side and a good-sized fuscous spot in the middle of all but the basal segments.

Tip of abdomen luteous, above with long dark hairs; superior part split, a transverse row of black spines at base; inferior part beset with black spines; below, two small cylindrical or slightly clavate luteous appendages, twice as long as broad and armed with dark spines or bristles, project from apex of last segment.

Legs of moderate length, luteous; armed with some long, and numerous short, black and pale spines; somewhat hairy. Tibial spurs as long or slightly longer than first tarsal joint, somewhat curved, rufo-piceous. Tarsal joints sometimes rufo-piceous at their apices, third and fourth especially so; claws somewhat more than half the length of last tarsal joint, moderately curved, rufo-piceous.

Wings hyaline. Pterostigma luteous, on inner side and below margined with fuscous ; before it, a few intercostals in anterior wings and a less number in posterior, forked. Veins hairy ; costal veins luteous ; the other principal longitudinal veins luteous, interrupted with fuscous at junctures of transversals ; smaller longitudinal veins luteous, interrupted irregularly with fuscous ; transverse veins of costal series and some of the others luteous, the rest fuscous.

Anterior wings with a series of small fuscous spots on basal portion of submedian vein above, at junctures with transversals ; three larger fuscous spots at intervals along the apical two-thirds of this vein ; bases of a few small apical forks sometimes slightly fumose ; posterior wings a little shorter than anterior, unspotted. Posterior borders of both wings fringed with fine hairs.

Male.—Length, 36 mm. ; expanse of wings, 49 mm. ; greatest width of anterior wing, 6.5 mm. ; length of antenna, 6 mm.

Antennæ less clavate than in female. Abdomen one-fifth longer than anterior wings ; the markings on the apical segments heavy and more or less confluent ; appendages short, half as broad as long, one-half length of seventh segment (viewed from below), subcylindrical, obtuse on tip, luteous, sometimes clouded with, or almost entirely, fuscous ; clothed with coarse black spines ; between the appendages below, a very short, triangular, luteous plate.

Type —No. 3813, U. S. National Museum. One female specimen collected in San Bernardino County, California, by Mr. D. W. Coquillett.

No. 3813a, U. S. National Museum. One male, taken at Phœnix, Arizona, June 1, 1897 ; from the collection of Mr. Chas. C. Adams.

Co-types.--One hundred and one females and seventy-two males taken at Phœnix, Arizona, in June, July and August, 1897, kindly loaned me for study by Mr. Chas. C. Adams, of Urbana, Illinois.

This unusually large and fine series of specimens exhibits some variations. In two of the females, and about the same number of males, the face and vertex are suffused with fusco-ferruginous, so that the fuscous markings are less apparent ; in a few specimens the band on upper part of face and its prolongation toward the clypeus are subobsolete ; in one male the face and clypeus have scattered fuscous spots in place of the usual markings. Small extra spots sometimes occur in the transverse row on the vertex, and two short longitudinal lines or spots are some-

times present behind the two middle dots of the row; the dots are occasionally connected by a narrow transverse fuscous line.

In a few specimens the third and fourth joints of the mixillary palpi are tinged with rufo-piceous, the second joint of the labial palpi is piceous apically, and the third entirely so.

The outer fuscous stripes of pronotum are in some specimens continuous to anterior margin, in others they end at the transverse furrow and are *not* indicated by spots in front of this furrow.

The inverted U-shaped markings on lateral lobes of mesonotum sometimes have their ends joined so as to form circles.

The tarsal joints are not always rufo-piceous at their apices.

CATOCALA ILLECTA, Walk.

In March last, Mr. E. N. Laing, of Essex, Ont., one of our young collectors, whilst on a visit to London availed himself of the opportunity to obtain the names of his captures. Whilst I was looking over his collection, a Catocala, with something quite unusual in its appearance to me, arrested my attention; and on comparing it with those in the Society's possession I found it was not there represented. Upon turning up Mr. Strecker's "Lep. Rhop. Et. Het." I found it therein vividly portrayed on Plate XI., fig. 9, and named by him *Catocala magdalena*. Not finding that name in Smith's list of 1891, I had to turn up the Synonymy, and found that it was known as *C. Illecta* of Walker.

It is a particularly attractive moth. Mr. Grote, in Trans. Am. Ent. Soc., Vol. IV., p. 13, says of it: "A broad-winged, moderately stout species, recalling *C. concumbens* in appearance and colour of primaries." This resemblance to concumbens is very striking, and has attracted the attention of nearly all of the describers. Walker gives the colour of the secondaries as "bright luteous, abdomen luteous"; Hulst., "bright yellow"; and Grote as "bright golden-yellow," which last seems to me to express it exactly. The yellow upper surface of the abdomen, corresponding to the colour of the hind wings, instead of the gray of the front ones, is very noticeable. Walker gives the habitat as "United States." Mr. Strecker's figure was drawn from an example taken at Indianapolis in 1874, but he afterwards received specimens from Texas. Dr. Hulst, writing in 1885, gives Ill. Neb. to Texas as its habitat; and Dr. Smith, as late as 1893, gives the same. So this discovery of *C. Illecta* is of some importance as considerably extending its range. Mr. Laing took his specimen of it in the season of 1896, at electric light.

J. Alston Moffat.

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CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 1.)

For many years past, those most interesting of Hymenopterous insects—the Horntails and the Sawflies — have received the closest study by some of the ablest Hymenopterists of the world. Cresson and Norton, in America; Newman, Westwood, Kirby, and Cameron, in England; Klug, Hartig, and Konow, in Germany; Lepeletier and André, in France; and Thompson, in Sweden, have all contributed much to our knowledge of these insects, and made decided improvements in their classification.

Mr. Peter Cameron, in his excellent Monograph of the British Phytophagous Hymenoptera, Vol. I., published in 1882, has given a thorough review of the progress made in the systematic arrangement of these insects; besides, on the completion of the work, some years later, gives a full bibliography on the subject; so that it is unnecessary here to repeat or enter particularly into this part of the subject, since this work is so easily accessible to the student.

I shall here, therefore, very briefly refer to Cameron's work on the group, and that of a later writer, Mr. F. W. Konow.

Mr. Cameron, in his work, made some decided improvements in the classification of these insects, and gave excellent tables for the separation of families and genera.

He recognized only four families: I. *Tenthredinidæ*, II. *Cephidæ*, III. *Siricidæ*, and IV. *Oryssidæ*, and some of these he again subdivides into subfamilies, tribes and subtribes.

The latest systematist to work in the group, a most prolific writer, and a profound and energetic student of these wasps, is Mr. F. W. Konow, of Teschendorf, who in the Deutsche Entomologische Zeitschrift, for 1890, proposed almost an entire new arrangement, besides giving a very unique and original method for showing the relationship of the different groups or tribes recognized by him.

In this paper, he considered the vast number of species, now known in the world, to belong to a single large family which he called the *Tenthredinitæ*, and then separates it into three subfamilies as follows: i. Lydetæ, ii. Siricetæ, and iii. Tenthredinetæ. The Lydetæ he divides into four tribes: (1) *Lydini*, (2) *Cephini*, (3) *Pinicolini*, and (4) *Blasticotomini;* the Siricetæ into three tribes: (5) *Xiphydriini*, (6) *Siricini*, and (7) *Oryssini;* while the Tenthredinetæ he divides into four tribes: (8) *Cimbicini*, (9) *Argini*, (10) *Lophyrini*, and (11) *Tenthredinini.* Many of these he again subdivides into subtribes, which agree in the main with some of the subfamilies of other authors.

Since this publication appeared, he has, in several very valuable contributions, still further elaborated his system, and in many clear and admirable tables has greatly enlarged our knowledge of genera and species.

The present status of Konow's systematic work in the group is probably well expressed in Dr. Von Dalla Torre's "Catalogue of the Tenthredinidæ," representing Vol. I. of his *Catalogus Hymenopterorum*, published in 1894, and which, in the main, appears to be arranged in accordance with the views published by Konow, up to date of publication.

In this Catalogue, 18 subfamilies are recognized, arranged in the following sequence: (1) *Dolerinæ*, Thomson, 1871; (2) *Tenthredinidæ*, Newman, 1834; (3) *Selandriidæ*, Thomson, 1871; (4) *Blennacampinæ*, Konow, 1890; (5) *Hoplocampinæ*, Konow, 1890; (6) *Nematinæ*, Thomson, 1871; (7) *Lophyrinæ*, Thomson, 1871; (8) *Pterygophorinæ*, Cameron, 1878; (9) *Lobocerinæ*, Kirby, 1882; (10) *Hylotominæ*, Newman, 1834; (11) *Cimbicinæ*, Leach, 1817; (12) *Oryssinæ*, Newman, 1834; (13) *Siricinæ*, Newman, 1834; (14) *Xiphydriinæ*, Thomson, 1871; (15) *Blasticotominæ*, Thomson, 1871; (16) *Xyelinæ*, Newman, 1834; (17) *Cephinæ*, Westwood, 1840; and (18) *Pamphiliinæ*, Dalla Torre, 1894.

I have gone somewhat particularly into the present arrangement of these insects, and probably further than was really necessary as an introduction to the present series of papers on their classification: 1st, Because my own views are so at variance with other systematists; 2nd, Because I have recognized no less than 15 distinct families; and, 3rd, Because I have separated, quite widely, groups and genera that were previously placed together or in juxtaposition.

This separation will become more apparent in the articles that are to follow the present introductory paper, which will include synoptic tables for the recognition of the genera of the world.

Another thing, and a very important one, which has greatly influenced me, in making so many families, is, that not only do the imagoes themselves seem to possess good morphological characters that justify this separation, but that these are, in many instances, seemingly correlated by excellent morphological characters possessed by the larvæ, which would seem to indicate many natural groups.

My present views, respecting the arrangement of the series and families recognized, are incorporated in the following tables:

II. Sub-order Phytophaga.—Abdomen broadly sessile; larvæ with legs.
Anterior tibiæ with one apical spur.....Series I.—Xylophaga.
Anterior tibiæ with two apical spurs.....Series II.—Phyllophaga.

Series I.—Xylophaga.

This series represents four distinct families, which may be separated by the following characters:

Metathorax fissured in the middle at apex.....2.
Metathorax not fissured.
Vertex tuberculate; antennæ inserted below the clypeus and eyes; front wings with two submarginal cells; abdomen cylindrical or depressed; ovipositor not exserted.....Family I., Oryssidæ.
2. Middle lobe of mesonotum attaining the scutellum and separated from it by a transverse line; abdomen cylindrical or depressed.
Prothorax large, subquadrate; costal cell of front wings not divided by a transverse nervure; tip of abdomen ending in a triangular or lanceolate process.....Family II., Siricidæ.
Prothorax conical; costal cell of front wings divided by a transverse nervure; abdomen at tip normal...Family III., Xiphydriidæ.
Middle lobe of mesonotum not attaining the scutellum; abdomen more or less compressed.....Family IV., Cephidæ.

Series II.—Phyllophaga.

This series I have separated into eleven distinct families, distinguished as follows:

Prothorax emarginate behind; middle lobe of mesonotum much longer than broad, not separated from the scutellum by a deep fovea; costal vein usually strongly thickened or clavate towards apex; costal cell without an intercostal vein.....2.
Prothorax subtruncate behind; middle lobe of mesonotum not much longer than broad, and separated from the scutellum by a deep

fovea; costal nervure towards apex neither thickened nor clavate, the cubitus originating from the basal nervure; costal cell with an intercostal vein; scape of antennæ long or rather long.

Head transverse, the temples not very broad; third joint of antennæ very long, three or four times longer than the long scape; ovipositor more or less exserted... Family V., Xyelidæ.

Head quadrate, the temples very broad, third joint of antennæ rarely much longer than the scape; abdomen much depressed, the ovipositor hidden..... Family VI., Lydidæ.

2. Basal nervure in front wings usually uniting with the subcostal vein far from the origin of the cubitus; basal plates of first abdominal segment usually closely united, rarely showing a slight median emargination at apex; if deeply emarginate, the sides of the abdomen acutely margined, while the antennæ are clavate.....7.

Basal nervure in front wings usually uniting with the base of the cubitus or with the subcostal very near its base; basal plates of first abdominal segment most frequently not united, medially slit or with a wedge-shaped or broadly triangular emargination, sides of abdomen rounded, never acutely margined.

Front wings with two marginal cells.....6.

Front wings with one marginal cell.....3.

3. Front wings without a lanceolate cell.....5.

Front wings with a lanceolate cell.

Antennæ 9- to 25-jointed.....4.

Antennæ 3-jointed.

Hind wings with an anal cell; tibiæ usually with lateral spurs; antennæ in ♀ with the third joint very long, subclavate or filiform, densely hairy, in ♂ most frequently forked..... Family VII., Hylotomidæ.

4. Hind wings with an anal cell; ♀ antennæ usually serrate or subserrate, ♂ antennæ ramose or biramose.. Family VIII., Lophyridæ.

Hind wings without an anal cell; ♀ antennæ most frequently subclavate or filiform, ♂ antennæ usually ramose or filiform..... Family IX., Perreyiidæ.

5. Hind wings without an anal cell; antennæ 6- to 25-jointed, in ♀ clavate or subclavate, more rarely filiform, in ♂ ramose, or simple, filiform, multiarticulate..... Family X., Pterygophoridæ.

6. Body rather short, oviform, the abdomen not long; scape small, scarcely longer than thick, not or only a little larger than the pedicel (except in the Blasticotominæ, which has, however, only 4-jointed antennæ); antennæ 4- to 15-jointed; head, seen from above, not quadrate, the occiput more deeply concave, the temples not so broad, more rounded behind, while there is no distinct furrow or depression between the antennæ and eyes, or so slight as to be scarcely noticeable.....Family XI., Selandriidæ.

Body elongate, the abdomen usually long, narrow and subcylindrical; scape rather large, usually thrice as long as thick or about four times larger than the pedicel; antennæ 9-jointed; head, seen from above, quadrate, the temples very broad and with a furrow, channel or depression on each side of the antennæ, between them and the eyes, which extends upwards and posteriorly on the vertex.....Family XIV., Tenthredinidæ (pars) (= Subfamily Strongylogasterinæ).

7. Front wings with two marginal cells.....8.

Front wings with one marginal cell; second submarginal cell receiving two recurrent nervures; lanceolate cell contracted near the middle and closed at base, or petiolate; antennæ 9-jointed.....Family XII., Nematidæ.

8. Abdomen acutely margined at sides; antennæ clavate, 5- to 8-jointed..9.

Abdomen not margined at sides; antennæ not clavate, 8- to 9-jointed; front wings with three or four marginal cells.

Front wings with four submarginal cells, the second usually receiving both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus, very rarely joining the base of the third submarginal cell; abdomen short, oviform.....Family XIII., Dineuridæ.

Front wings with four submarginal cells, the second and third each receiving a recurrent nervure; if with three submarginal cells, either the first or the second transverse cubitus is wanting; abdomen elongate, subcylindrical..Family XIV., Tenthredinidæ.

9. Dorsal plates of first abdominal segment usually deeply emarginate medially, leaving a membrane exposed....Family XV., Cimbicidæ.

NEW BEES FROM NEW MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Podalirius phenax, n. sp.—♂. Length about 9 mm.; appearance of *P. maculifrons* (Cress.), with the same white pubescence (mixed with black on hind part of mesothorax and front part of scutellum), the same clear wings (but the second submarginal cell is less narrowed above), and the same legs, except that the tarsi are wholly dark. The black antennæ are considerably longer, when the head is thrown back they reach to postscutellum; scape with a broad white stripe; first joint of flagellum a little *shorter* than third. Eyes a beautiful dark lavender or gray-blue, instead of green. Clypeus (except the narrow black anterior edge) a transverse supraclypeal band, lateral face-marks (triangular, with the upper side deeply excavated), labrum (except the usual pair of spots), and a large patch on mandibles, pure white, shining, like porcelain. Abdominal bands more or less interrupted in the middle; fifth segment without a band; apex with two spines.

Hab.—College Farm, Mesilla Park, N. M., April 13, 1898, at flowers of plum. Allied to *P. albatus* and *P. maculifrons*.

Andrena subaustralis, n. sp.—♀. Length about 10 mm.; black, the abdomen with a hardly noticeable greenish lustre. Pubescence rather abundant, but not hiding the surface, dull white, on upper parts of head and thorax pale dull ochreous. Head broad, facial quadrangle broader than long; face hairy; clypeus strongly and closely punctured, with no median smooth line; frons strongly striated; antennæ black, brown at tips; mandibles rufescent at ends, with a strong inner tooth; process of labrum broad, truncate at end. Mesothorax minutely tessellate, with rather shallow and sparse punctures; enclosure of metathorax triangular, poorly defined, minutely granular, feebly wrinkled at the base. Legs dark, quite densely pubescent, the pubescence on tarsi more or less tinged with fulvous. Tegulæ black; wings yellowish-hyaline, apical margin broadly smoky, but not conspicuously darkened; nervures and stigma honey colour. Abdomen oval, convex, tessellate and very minutely punctured; first and second segments with some white hair at sides; third to fifth segments with very thin bands of long white hairs, that on the third very broadly interrupted; anal fimbria bright orange-fulvous.

♂.—Similar, but smaller and narrower; flagellum wholly dark;

pubescence of thoracic dorsum with quite a fulvous tint ; abdomen thinly pubescent, but hardly banded, hair at apex yellowish or nearly white.

Hab.—Paraje, N. M., April 11th, 1898, at flowers of plum ; 3 ♂, 1 ♀. Differs from *A. Belfragei* by the pubescence being not so bright, clypeus without impressed line, wings not very dark at apex, abdomen not so punctate. Also rather resembles *A. polemonii*, Rob.

*Andrena pruniflori*s, n. sp.—♀. Slightly over 10 mm. long, black, with grayish-white to white pubescence ; *hind tibiæ, and all the tarsi, bright ferruginous.* Head broad, facial quadrangle broader than long ; face hairy, but not so as to hide the surface ; clypeus minutely rugose and strongly punctured, with a small shining space in the median line not far from the anterior margin ; frons striate, with punctures between the ridges ; vertex minutely tessellate, and punctured ; antennæ dark, flagellum only faintly brown towards the end, first flagellar joint fully as long as the two following together ; process of labrum broad and low, feebly emarginate ; mandibles wholly dark. Thorax with rather abundant pubescence, not hiding the surface, grayish-white or very pale mouse colour on mesothorax, otherwise white ; mesothorax microscopically tessellate, with strong, rather close punctures ; metathorax dull, enclosure triangular, ill-defined, with irregular feeble raised lines. Tegulæ piceous ; wings smoky subhyaline, nervures and stigma dark brown, third submarginal cell narrowed about one-half to marginal. Abdomen somewhat depressed, *shining, very distinctly punctured;* hind margins of third and fourth segments with entire dense snow-white bands, second segment with a similar band broadly interrupted in middle, first with only patches of white pubescence at the sides ; *anal fimbria sooty.*

Hab.—Paraje, N. M., April 11, at flowers of plum. Allied to *A. violæ*, Rob.

Hesperapis, n. g.—A small bee with the general aspect of a Phileremine. Body rather densely clothed with very short mosslike pubescence ; longer hairs intermixed ; abdomen with entire hair-bands. Wings rather short ; stigma subobsolete ; marginal cell large, obtusely pointed, the apex not diverging from the costa ; two submarginal cells, the second about two-thirds the length of the first, narrowing rather more than one-half to marginal ; both recurrent nervures joining the second submarginal cell at about the end of the first and beginning of the last fifths. Hind legs with large black bristles. Ocelli large, very prominent,

in a broad triangle. Tongue short, pointed, daggerlike, its margin entire. Labial palpi 4-jointed, first joint long, but not excessively so, nearly as long as 3 and 4 together, these being about equal; 2 somewhat shorter than 1. Maxillary palpi 6-jointed, first three joints moderately stout, the other three very slender; 2 conspicuously longest, all the others about equally long. No ventral scopa in ♀.

Hesperapis elegantula, n. sp.—♀. Length, 6½ mm.; head and thorax black, abdomen dark ferruginous. Head oblong, facial quadrangle considerably longer than broad; face and cheeks with short snow-white pubescence, vertex with ochreous pubescence; clypeus with minute, rather sparse punctures; mandibles slender, reddish except at the extreme base, armed with a small tooth on the inner side; labrum clear ferruginous; antennæ short, especially the flagellum; scape and the rather large funicle black, flagellum brown; eyes dark, with a perceptible sage-green tint; pubescence of mesothorax and scutellum short and mosslike, with long hairs intermixed, ochraceous throughout, almost hiding the densely punctured surface; pubescence of postscutellum, metathorax and pleura white; basal triangle of metathorax minutely roughened, free from pubescence; tegulæ testaceous, pubescent; wings not reaching as far as tip of abdomen, hyaline, slightly milky or opalescent, stigma honey colour, nervures brown, subcostal nervure black; legs black, the knees and the hind tibiæ behind, reddish; pubescence of legs dull white; middle tarsi with a brown brush within; small joints of anterior tarsi with long dark lateral pencils of hair; outer side of hind tibia, and of basal joint of hind tarsus, with minute snow-white dense pubescence, and numerous long black bristles; abdomen somewhat depressed, of ordinary form, with five entire broad white hair-bands on the apices of the segments; the exposed ferruginous surface between the bands very minutely and closely punctured; fifth segment and apex with black bristles; pygidium shining, impunctate, with a small groove near its end; venter ferruginous, with no conspicuous pubescence.

Hab.—Mesilla Park, New Mexico, on campus of the Agricultural College, April 22, 1898, at flowers of *Dithyræa wislizenii* probably, possibly at *Senecio*. Collected by Mr. C. M. Barber.

This remarkable little bee seems to be most nearly allied to *Ammobates (Phileremus)*, but it differs entirely in the mouth-parts, and might probably form a new tribe. From its structure and appearance it is probably parasitic in the nests of some other bee.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXIX. The Œdemeridæ and Cephaloidæ of Ontario and Quebec.

The family Œdemeridæ is of small extent, only five species, representing four genera, being recorded from the region under discussion. None of our species are very small and two of them at least often reach a size sufficient to render them readily noticeable. With the exception of *Nacerdes melanura*, which frequents houses, wharves, lumber piles and shipping, they are to be found on bushes and trees or else under boards in wooded districts.

Technically they may be defined as beetles having the hind tarsi four-jointed, the remainder five-jointed; the anterior coxal cavities open behind; the head not strongly and suddenly constricted at base; and the middle coxæ very prominent. The claws are either simple, dilated at base or with a basal tooth.

In appearance the genera differ considerably; however, those in our fauna belong to the three types of habitus of which figures are given, *Nacerdes* resembling *Asclera* in general form. It is hoped, therefore, that the collector may have no difficulty in identifying his Canadian captures. The generic table following is constructed on the lines laid down in the Classification and in Dr. Horn's recently published memoir:

A. Eyes deeply emarginate, embracing the base of the antennæ, which are nearly as long as the body. Appearance much like a slender *Elaphidion*..... ..... *Calopus.*

AA. Eyes entire or nearly so.

b. Form robust, colour black with faint violet tinge. Tarsi with several joints spongy-pubescent beneath..... *Ditylus.*

bb. Form slender, colour in part reddish or yellow.

c. Anterior tibiæ with one spur. Colour above yellowish, elytra tipped with black. Antennæ of male twelve-jointed ..... *Nacerdes.*

cc. Anterior tibiæ with two spurs, antennæ eleven-jointed in both sexes. Colour blackish, prothorax wholly or in part reddish..... ..... *Asclera.*

Of course, it must be understood that the colour-characters given above are intended to apply only to the Canadian species.

CALOPUS, Fab.

FIG. 13.

C. angustus, Lec., would probably be taken by most beginners for a Longhorn on account of its slender form and brownish colour, which cause it to resemble, in general, certain species of *Elaphidion*. The antennæ are almost as long as the entire body. Surface of body brownish, pubescence scant, whitish. Head, including the eyes, about as broad as the prothorax, which is broadest at about one-third from apex, the sides arcuate in front, nearly parallel posteriorly; the thoracic disk is uneven with a broad ill-defined median impression, punctuation distinct. Elytra at base much broader than the prothorax, nearly parallel, slightly broader behind, each with three ill-defined costæ. Length, .50–.72 inch. Occurs also in the western United States, particularly in mountainous regions. Such specimens as I have met with were found under stones or boards. The form of this insect is shown in fig. 13.

DITYLUS, Fisch.

D. cæruleus, Rand., is stout, black with a violaceous tint most evident on the prothorax. Head punctured and rugose, prothorax finely and rather closely irregularly punctured, broadest in front of middle, sides oblique, hardly sinuate to base, which has a raised margin or collar. Median line distinct but not well defined. Elytra finely granulate or shagreened* with short, scarcely visible pubescence; each with four well-defined and nearly equidistant costæ. These costæ are but slightly elevated, their distinctness being due to the striæ bounding them on each side. Length, .48–.75 inch. (Fig. 14.)

FIG. 14.

Two other species are found in the Western or Pacific provinces: *D. gracilis*, Lec., which has a longer thorax (distinctly longer than wide), with less dense punctuation and not noticeably clothed with pubescence, and *D. quadricollis*, Lec., with a subquadrate thorax which is densely punctured, pubescent and opaque. In size these do not differ greatly from *D. cæruleus*, and so far as I have observed them their habits are the same.

NACERDES, Schmidt.

N. melanura, Linn., is an introduced form abundant in the Atlantic

*Dr. Horn has erroneously described them as "densely punctate."

cities and occasionally swarming on shipboard. It is readily recognized by the slender form, hardly broader behind, colour above yellowish, the elytra with blackish tips. Beneath it is blackish, the legs in part yellow. It reaches a length of about half an inch.

ASCLERA, Schmidt.

The two species of this genus are blackish insects of slender form, though not so elongate as *Calopus*, the prothorax more or less red, the elytra distinctly costate. They separate thus :

FIG. 15.

Prothorax red, with three foveæ (one near middle of base, the others anterior to this and placed one on each side of the median line). Elytral costæ sharply elevated. .20–.26 inch..... .....*ruficollis*, Say.

Prothorax with a large central blackish spot, the disk depressed more deeply on each side of the middle line. Elytral costæ distinct but less sharp than in the preceding species. .26–.32 inch. (Fig. 15.)..... . *puncticollis*, Say.

Allied to the Œdemeridæ is the small family Cephaloidæ represented in North America by the genus *Cephaloon*, which resembles in form a Longhorn of the Lepturoid series. The characters separating the two families are to be readily perceived in the form of head and claws. In *Cephaloon* the head is constricted behind and the claws are pectinate, besides bearing a long appendage. While only one species (*C. lepturides*, Newm.) has been actually reported from the eastern provinces, we copy Dr. Leconte's table of all the American species, since one (*C. tenuicorne*) has been taken on the Stickeen River in British Columbia, and the other may yet be met with in Canadian territory, since it is known from the White Mountains and Lake Superior. Dr. Leconte's table, amplified by the addition of some other characters, runs thus :

A. Appendages of claws broad, rounded at tip.

b. Outer joints of antennæ gradually broader, not elongated. Colour extremely variable and inconstant, may be entirely testaceous ; the usual colour is piceous, legs (in part), head (with or without a frontal dark spot of varying size), and prothorax (often with a discal spot and more or less of the sides dark), testaceous. .36–.48 inch.....*lepturides*, Newm.

bb. Four outer antennal joints slightly broader, the joints longer, especially the intermediate ones. Colour variable, testaceous,

head behind the antennæ, sides of elytra, under surface and sometimes also the legs (in part), and a median thoracic spot, piceous. .44–.48 inch ..... *tenuicorne*, Lec.

AA. Appendages of claws curved, acute, slender. Very elongate, testaceous or piceous, antennæ slender, filiform, scarcely thickened externally, joints 9–11 longer. .44–.50 inch ..... *ungulare*, Lec.

The few papers treating of the above families in systematic form are:

1854. Leconte, J. L. Synopsis of the Œdemeridæ of the United States. Proc. Acad. Nat. Sci., Phila., VII.

1866. Leconte, J. L. New species of Coleoptera. Smithsonian Misc. Coll. [Table of *Copidita*, p. 164; of *Oxacis*, p. 165.]

1874. Leconte, J. L., and Austin, E. P. Catalogue of the Coleoptera of Mt. Washington, N. H., with descriptions of new species. Proc. Bost. Soc. Nat. Hist., XVI. [Table of *Cephaloon* on p. 276.]

1896. Horn, Geo. H. The Œdemeridæ of North America. Proc. Cal. Acad. Sci., 2nd Ser., VI.

NOTES ON PHILANTHUS.

BY S. N. DUNNING, HARTFORD, CONN.

I have been so fortunate as to have, while making the following notes, the collection of *Philanthus* belonging to the Academy of Natural Sciences before me.

Philanthus Sanborni, Cress. (Philanthus Trumani, Dun. Ent. News, VIII., 70, ♂, not ♀.)

This species does not always have the W-shaped mark on face described by Cresson.

Philanthus punctatus, var. *Cockerelli*, Dun. Ent. News, VII., 69 (1896).

The characters given by Cockerell, Ent. News, IX., 26 (1898), separate this from typical *punctatus*.

Philanthus scelestus, Cr.

On *Geranium* (probably *Richardsoni*). Evergreen, Colo., July 17. Also Santa Fé, New Mex., in August. (Ckll., 4252.)

Philanthus sublimis, Cr.

Vancouver Island, July 10–18, by Mr. C. Livingston.

Philanthus cleomæ, n. sp.

♀.—Length, 10–11 mm. Black, partly shining, with pale yellow markings. Clypeus, mandibles (except tip), two spots on genæ near base of mandibles (sometimes connected with line behind eyes), sides of face

to emargination of eyes, large subquadrate extension between antennæ, line behind eyes, two spots on vertex (sometimes connected), collar (sometimes a line or mark at sides or below), two spots on fore part of scutellum, spatulæ, postscutellum, two narrow lines and two large patches on metathorax (sometimes connected), tegulæ, tubercles, two small and one large spot behind and below (sometimes running underneath the thorax and connecting), interrupted band on first segment, usually emarginate, but sometimes interrupted band on second, emarginate bands on 3–5, all but apex of sixth, and almost all of legs (including coxæ), yellow; tarsi with a pale rufous tendency; antennæ brownish; a very few hairs on head and venter; distance between eyes about their greatest length; first joint flagellum distinctly longer than second; vertex and mesothorax with sparse fair-sized punctures, scutellum and postscutellum hardly punctured, enclosure of metathorax finely wrinkled, metathorax roughened rather than punctured, abdomen with large close punctures, becoming smaller towards apex, sixth segment but faintly punctured, venter sparsely so; wings hyaline, slightly clouded in outer half, nervures light rust coloured; collar declivitous.

Six females, four belonging to the Academy of Natural Sciences, and two in my own collection.

Hab.—Montana; S. Bernardino Co., Cal.; Las Cruces, New Mex.; (Ckll., 4786, on *Bigelovia)* and Denver, Colo. (D. 1105c and D. 1271a, on *Cleome serrulata.)*

Philanthus henricus, Ckll. and Dun., n. sp.

♀.—Length, 14 mm. Black with yellow and rufous markings. Mandibles (except piceous tip), clypeus, sides of face to emargination of eyes, a short emarginate extension between antennæ, a narrow line behind each eye, collar, tegulæ, small spot on tubercles, a larger spot behind, postscutellum, scape (partly), interrupted band on first segment, a narrowly interrupted band on second, emarginate bands on third and fourth, all of fifth and the last (except rufous apex), venter (except fore part more rufous), a spot on trochanters and last four coxæ, rest of legs (except rufous femora and rufous inclined tarsi), yellow. Yellow on face paler; a faint irregular rufous mark centrally on second segment; third joint antennæ as long as fourth and fifth combined; eyes as distant as their length; a fairly thick and long ochraceous pubescence on head, more sparse on thorax and still more so on venter; vertex, mesothorax, scutellum, postscutellum, disk of metathorax, abdomen and femora

shining ; basal segment constricted as in *punctatus*. Punctures on vertex distinct, fair sized, scattered ; on mesothorax and scutellum rather finer, scattered ; of about the same size on metathorax, but closely crowded (fovea with fine transverse wrinkles not Λ shaped or coarse as in *flavifrons*) ; on abdominal seg. 1–2, large and pit-like as in *punctatus*, still large but sparse on seg. 3, on remaining seg. fine and so few as to be hardly apparent. Wings hyaline, a little dusky at centre and more so at apex ; nervures pale rust-coloured.

One female in collection ; T. D. A. Cockerell.

Hab.—New Mex. (N. F. Gila, July 16).

In marking like *flavifrons*, Cr., and in build like *punctatus*, Say.

Philanthus multimaculatus, Cameron (Philanthus annæ, Dunning. Ent. News, 1897, p. 68, ♂, not ♀). Four males and three females before me ; the former are about 8–10 mm. long, the latter 11–12 mm. Las Cruces, N. Mex., on *Salix*, May 2, 1 ♂ (Ckll.) ; Mesilla, N. M., June 24, on *Aster spinosus*, 1 ♀ (ident. Ckll.) ; Calif. (taken by Prof. Griffith, Los Angeles), 2 ♀ ; Colo. (Baker, No. 1591), 1 ♀ ; Denver, Colo., July 20, 2 ♂, on *Cleome serrulata* (D. 1105a, D. 1271b).

Philanthus serrulatæ, n. sp.

♀.—Length, 9 mm. Black with yellow markings. A few ochraceous hairs on head and venter ; distance between eyes on vertex equal to length of joints, 3–5 of antennæ ; 3d. jt. antennæ longer than 4–5 combined ; cavities at extremities of scutellum and postscutellum, like *multimaculatus*, Cam., and others ; wings fulvo-hyaline, not clouded, nervures and stigma pale rust-coloured ; punctures on vertex close and fine, on mesothorax fine but irregularly scattered (postscutellum and scutellum not punctured), on metathorax close and fine, including enclosure (which is not well defined), on seg. 1–2 not quite so fine, but close, sparse on seg. 3 and still more so on seg. 4–5, on venter like seg. 1–2 ; face to ocelli (except base of antennæ), spot on scape and joints 3–5 on one side, spots on vertex and behind eyes, collar, two spots or lines centrally on mesothorax and two smaller spots at sides in front of tegulæ, scutellum, postscutellum, tegulæ, tubercles, spot behind, broad bands on seg. 1–2, narrow irregular bands seg. 3–6, knees, tibia, yellow ; apical 4 joints of antennæ and most of tarsi rust-coloured or rufous; collar declivitous.

From *multimaculatus* it differs at once in fine punctures, clear wings and markings ; from *arizonæ* in distance of eyes apart on vertex, cavities

at sides of scutellum and postscutellum, and in coarser and more irregular punctures of abdomen. One ♂ spcm., Denver, Colo., July 20, 1898, on *Cleome serrulata* (D. 1105b).

Philanthus arizonæ, n. sp.

♂.—Length, 7 mm. Jet black with pale yellow markings. A fairly thick growth of fine white pubescence on face and cheeks, more downlike on thorax, hardly apparent on abdomen; eyes close, about the distance apart on vertex of the length of joints 3–4 of antennæ; collar declivitous; wings clear, not clouded, nervures outwardly fuscous, stigma and towards base pale rust-coloured; no cavity at sides of scutellum and postscutellum; joints 3–5 of antennæ on one side, face to ocelli (except base of antennæ), two spots on vertex and two behind eyes, collar, two spots on fore mesothorax centrally, most of scutellum, postscutellum, tegulæ, tubercles, spot behind, knees, tibia, yellow; lower face, tegulæ and tubercles very pale, almost white; tarsi rust-coloured mostly; punctures on vertex fine, sparse, on mesothorax fine, closer (scutellum and postscutellum not punctured), metathorax (including poorly defined enclosure) fine, close, on abdomen fine and close, about evenly distributed, on venter scattered, fine.

One ♂ spcm. taken by Dr. Griffith, at Phœnix, Arizona, Nov., '97, and numbered D. 1331 in my collection.

"Collar declivitous," as used above, describes *P. punctatus*; not declivitous would describe *P. ventilabris*.

THE EPIPLEMIDÆ THE LOWEST BOMBYCIDS.

BY HARRISON G. DYAR, PH. D., WASHINGTON, D. C.

The Epiplemidæ are a family of moths fairly well represented in India. (See Hampson's Moths of India, III., 121.) Only one larva is known, that of *Epiplema latifasciata*, Moore, and unfortunately the figure is insufficient to show more than that the feet are normal (five abdominal pairs) and the setæ probably single. The family occurs also sparingly in America. Hulst lists three genera as a subfamily of Geometridæ, the Strophidiinæ (Trans. Am. Ent. Soc., XXIII., 309); but I would certainly prefer Hampson's treatment, both as to the name and rank of the group.

By good fortune some larvæ of one of our species were bred at the Department of Agriculture at Washington in 1882, and inflated larvæ prepared by Koebele. They have remained undescribed to the present time. The species is *Callidapteryx dryopterata*, Grt., which falls near

the Indian genus *Orudiza*, Walk. The larvæ are remarkable. They possess the five normal pairs of abdominal feet, with rather few crotchets on the inner three-fourths of the planta, double hooked, of two not very regular lengths. The setæ are distinct but short, with large tubercles, single except that vi. consists of two setæ, arising from separate tubercles on abdominal segment 3 and posteriorly, but from the same tubercle on segments 1 and 2. Tubercles iv. and v. are separate on the posterior segments, strictly in line, iv. not at all higher. On abdominal segments 1 to 3 they are united together. There is a distinct leg plate with scattered setæ. On the thorax i. a + i. b, ii. a + ii. b, iii. separate, iv. + v., vi. double. The prothoracic shield is broken up, the lateral piece the most distinct and bearing three setæ. The head has single setæ, fairly distinct. Those on the epicraneum are normal above; i., ii. and iii. forming a right angle; iv. below; v., vi. and vii. behind the eyes; vii. situated between the two lower ocelli; viii. above the level of the eyes, midway between them and the clypeus; ix. half way between viii. and the base of the antenna. (See Journ. N. Y. Ent. Soc., IV., 93, for numbering of head setæ.) I adjoin a figure showing the head and abdominal setæ of Callidapteryx in diagrammatic form. (Fig. 16.)

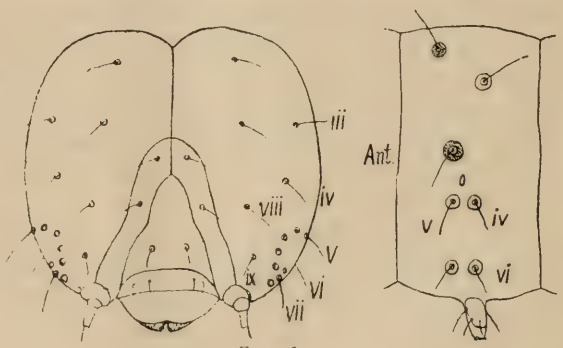


FIG. 16.

The interpretation of these structures is at first puzzling. There is a strange mixture of Bombycid and Tineid characters. Tubercle iv. is in its generalized position, yet on the forward segments it unites with v. as in the Tineids. But the fact that this union is not present throughout shows that it is a recent acquirement, for when such a character is congenital it is present on all the segments without equivocation. Another Tineid character is the union of the upper thoracic tubercles in pairs, especially of ii. b with ii. a. Again, on the head seta viii. is high up as in Tineids.

The Bombycid characters are the leg plates, the half row of crotchets on the feet, the doubling of tubercle vi. and breaking up of the cervical

shield. The usually decisive character of the position of tubercle iv. is here as indifferent as it could possibly be made. I explain the larva as follows: It is at the bottom of the Bombycids, and tubercle iv. has not yet taken up its definite position. The other Tineid anomalies are explained by a comparison with the Drepanidæ, with which this larva bears affinity in the setæ, although there is no hypertrophy of the anal plate. In *Drepana arcuata* the thoracic tubercles ii. a and ii. b are united, the epicranial seta viii. is high up, above the level of the eyes, and abdominal tubercle vi. is doubled, all as in Callidapteryx. Drepana is then also a low form, but here abdominal tubercle iv. is in the characteristic Bombycid position.

The Epiplemidæ, then, stand at the bottom of the Bombyces, throwing off on one side the Drepanidæ, on the other (judging from the moths) the Geometridæ. Near them the Notodontian stem has arisen, giving rise to the other Bombycid families. (See Proc. Boston Soc. Nat. Hist., XXVII., 146, for a geneological tree. The Epiplemidæ may be added at the point where the stem of the Drepanidæ joins that of the Geometriæ.)

Callidapteryx dryopterata, Grote.

The larvæ were found abundantly at the end of July on *Viburnum nudum*. Moths emerged August 16th, and eggs and young larvæ were found immediately after. Pupæ by September 6th between leaves. Evidently two-brooded. No description accompanies these notes in the books of the Department of Agriculture, and I do not think an adequate one can be made from the blown larvæ. They may have been green or whitish with broken brown lines, tubercles i. and iii. large and dark, the rest pale. Head spotted, 1.4 mm. wide. There is no record of whether the larvæ were exposed or concealed feeders. Stage I. is preserved mounted on a slide labelled 3/4/92, No. 2826, but so badly shrunken that I cannot see the arrangement of setæ. Feet slender, the crotchets nearly bordering the planta, anal plate prominent but not produced; setæ large.

The Toronto Branch of the Entomological Society of Ontario held its second annual meeting on the 1st of April last. The following officers were elected for the ensuing year: President, Mr. R. J. Crew; Vice-President, Mr. C. T. Hills; Secretary-Treasurer, Mr. Arthur Gibson; Librarian-Curator, Mr. H. D. Chipman; Members of Council, Messrs. H. C. Tyers and E. M. Fenwick. The Department of Education for Ontario has granted to the Society the free use of a room in which to hold its meetings and place its library and collections.

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, N. Y.

(Continued from page 121.)

LEPTOMERIS NIGRODISCALIS, n. sp.

Expands 24 mm. Palpi and front black; vertex ochre-white; antennæ whitish below, blackish or smoky above; thorax and abdomen white, slightly ochre stained. Fore wings white, with four somewhat indistinct, broad, even, wavy, ochre lines, the first well out from base, the second just outside of discal spot, the third in outer space, the fourth marginal; hind wings with corresponding broad lines; discal points prominent, rather large, jet black; four fine marginal black points below apex on fore wings; beneath more diffuse, more fuscous, less ochreous, the lines less determinate; discal spots not so marked, black points as above on margin of fore wings, and some appearing below apex along margin on hind wings.

Maine.

EOIS PERSIMILIS, n. sp.

Expands 23–26 mm. An insect strongly resembling in superficial appearance *Eois 5-linearia*, Pack. It is smaller than that species, with the hind wings rounded, and not angled as in *5-linearia*. The lines of the wing are brownish ochreous, and straight or slightly bent, not at all wavy and angulate as in *5-linearia*. The ground colour is a clearer white, and has a sprinkling of brownish or blackish scales. The cross lines are rather broadish, even in width, and quite distinct. Beneath as above, with the lines the same, though not so definite as above. Discal spot obsolete above, quite distinct, black, below.

Canada, from Quebec and Ontario; sent by Mr. Hanham, of Winnipeg. The species seems to be midway in some respects between *E. inductata*, Guen., and *E. 5-linearia*, Pack. Mr. Hanham writes me *inductata* is taken at Winnipeg in abundance on the open prairies, while this species he has taken only in dark woods.

EOIS HANHAMI, n. sp.

Expands 23–26 mm. Palpi black, front black, vertex white; thorax and abdomen white or slightly smoky stained; fore wings, ground colour white or slightly fuscous stained, with a sprinkling of blackish points sometimes numerous enough to give a fuscous shading; lines three,

rather faint, blackish, rounded, parallel with each other, equally separated, finely and evenly dentate so far as evidenced; hind wings with three corresponding lines; beneath, more fuscous than above, the inner lines fainter or entirely obsolete; fore wings, apex and outer margin rounded, hind wings without angle.

Closely allied to *E. 5-linearia* and *persimilis*, but with much more rounded wings, and the outer lines different in direction.

Winnipeg, Manitoba; from Mr. Hanham.

SYNCHLORA LOUISA, n. sp.

Expands 18-22 mm. Palpi dull red; front whitish or red below, red above; summit pure white; thorax light green, deep purple-red stained above in ♂, green in ♀; abdomen of ♂ white, deeply stained with purple-red above, end white, with a large snow white spot dorsally on basal segment, and another posteriorly on third segment, (abdomen of ♀ wanting); antennæ pure white, in ♂ pink tinted. All wings clear bright light green, edged with purple-red along costa, and on outer margins, this running out on fringe at end of veins more or less deeply; the colour is more heavy in the ♂, and broadens somewhat on fore wings on outer margin below apex, and at posterior angle; fringes white, more or less purple stained in ♂; discal spots present on all wings, fine, reddish. Beneath smooth, even, silky white, with a greenish tinge; marginal lines fine, purple.

Cocoanut Grove, S. Florida. A very pretty insect. One type in National Museum, No. 3918.

SYNCHLORA VIRIDIPURPUREA, n. sp.

Expands 25–27 mm. Palpi reddish at end, end member very long; front reddish below, dark green above; summit pure white; antennæ white at base, becoming light ochre outwardly; thorax deep clear green; abdomen deep green, the posterior segments light green anteriorly, end reddish, with reddish spots dorsally on posterior segments. All wings deep green, even, somewhat striated with whitish; fore wings with apex sharp, subfalcate; discal point small, reddish-brown; marginal line purplish; an indication of an outer line is given in red spots on the veins towards costa, which become a large purple blotch filling the wing at inner angle, extending one-third towards base, and nearly half way to costa. The hind wings have a diffuse purplish discal spot, purplish marginal line, and a large rounded purple blotch along anal margin and within anal angle; beneath, whitish-green, the purplish blotches faintly showing; body white below, with some reddish on abdomen.

Charlotte Harbor, Indian River and Lake Worth, Florida; of the size and form of *S. hollandaria*, Hulst, especially distinct, however, in lacking the white spots on wings. I have seen ♀ ♀ only, and the genus may not be properly determined.

SYNCHLORA TEXANA, n. sp.

Expands 25 mm. Palpi and front reddish; antennæ light ochre; thorax clear green; abdomen light green, with pure white spots, rather large, on each segment dorsally. Fore wings, costa rounded, apex pointed, posterior angle distinct, the wings clear green, quite evenly striated with white; inner line scarcely evident, outer line not very distinct, strongly wavy, about parallel with outer margin, discal spots prominent, distinct, reddish-brown; marginal line clear distinct reddish-brown also, fringes white, reddish-brown at end of veins. Hind wings of same colour as fore wings, posterior angle prominent, outer margin somewhat wavy; discal spot distinct, reddish-brown; marginal line distinct, reddish-brown, fringe white, red at end of veins. Beneath whitish-green, even; discal points and marginal line reddish-brown, not so sharp as above; costa of fore wings above and below, as also fore tibiæ on inner side, tinged with reddish.

Austin, Texas. I have the male only.

APLODES CATACHLOA, n. sp.

Expands 24 mm. Palpi and front reddish; palpi of ♂ short and stout; antennæ light ochre, pure white on top of stem; summit pure white; collar red; wings bright green, somewhat washed with white, and intermixed with white scales, broad, rounded, a small red spot costally at base, the rest of costa narrowly white; two not very distinct cross lines continued across both wings, the inner less wavy, the outer more distinct, two-thirds out, parallel with outer margin and wavy; discal spots distinct, blackish-brown; margins red; fringes white. Beneath light whitish-green, the fore wings anteriorly slightly greener than the rest; fore wings with costa rather broadly ochre nearly to apex; discal spots distinct, blackish; margin faintly reddish; thorax dark green above; abdomen above green at base, becoming white at end, with a greenish tint dorsally; on third, fourth, fifth and sixth segments dorsally, red enclosing pure white subtriangular spot; beneath pure white, except that femora and tibiæ of fore legs are red in front.

Charlotte Harbor, Florida. Mrs. Slosson.

APLODES OBLIQUA, n. sp.

Expands 26 mm. Palpi and front ochre, stained with reddish; summit white; antennæ ochre, white above; collar green; thorax, front and tegulæ deep green, dorsally and posteriorly dull ochre; abdomen ochre-white, with reddish on segments above; fore wings deep even green, whitish-ochre along costa, with two broad white lines; the inner, one-third out from base and reaching inner margin an equal distance from base; the outer line two-thirds out, parallel with outer margin, thus very closely approaching basal line at inner margin, while widely separated at costa; a red marginal line, fringe pinkish, discal spots wanting; hind wings deep green, lighter at base; lines broad, white, the basal not distinct, the outer only slightly rounded; marginal line red, fringe pinkish. Beneath as above, but lighter green, and lines less distinct.

Colorado; from Mr. Bruce.

DEILINIA PULVERARIA, n. sp.

Expands 35–38 mm. Palpi black; front dark brown; thorax dark brown, mixed with blackish; abdomen dark fuscous; fore wings dark fuscous, overlaid with black scales, with many of violet-brown, giving a general dark, almost blackish-brown colour; this darkest at base as shading of basal line, as a broad band over central portion and on outer and submarginal portions; between middle and outer lines is a band of reddish-brown, and on submarginal field a line of whitish lunules or scallops; a marginal line of black dashes present; discal spot a whitish annulus; hind wings fuscous in dark cross striations, heaviest and so darkest outwardly; discal spots distinct, black. Beneath fore wings fuscous, with cross striations, cell more darkened, with an outward black band, distinct towards apex, obsolete before inner margin; hind wings fuscous, with coarser blackish striations darkening the outer portion of the wing, the wing outwardly having a brownish tint.

Rossland, British Columbia; from Mr. Danby. Taken by him from April 18th to May 9th. The general appearance of the insect is much like *D. litaria*, Hulst.

DEILINIA BEHRENSARIA, var. CERVINICOLOR, n. var.

I wish to give this varietal name to the marked cervinous form of *D. behrensaria*, Hulst. The type form is reddish-ochre or ochre, while the variety is very distinct in appearance, being of the colour stated above, this replacing the colour of the type on all wings.

MACARIA PICTIPENNATA, n. sp.

Expands 23–27 mm. Palpi fuscous gray; thorax and front light, clear gray; abdomen gray, fuscous stained; fore wings clear gray, overlaid with blackish in fine dots and striations; inner line faint across the wing, with a black spot at costa, nearly straight; median shade faint, also black at costa; outer line white, only slightly sinuous, edged on both sides with blackish, this becoming heavy black spots at costa and vein 4; a submarginal shade and black or broken black margin; hind wing fuscous gray, darker outwardly, striated, without lines; discal spots evident on all wings, but not strong; beneath light gray with fuscous tinge, and an ochre shading, nearly white on inner half of hind wings, the outer third on all wings darker.

Prescott and Senator, Ariz.; from Dr. Kunzé. Taken July 1st, and Sept. 1st to Sept. 9th, 1896. The insect is bright in appearance, resembling *Sciagraphia muscariata*, Guen., but brighter, and with outer line not angled near costa, differing as well as in the antennal structure of the male.

NACOPHORA QUERNARIA, var. ATRESCENS, n. var.

I have received this very marked form from Mr. Moffat, of London, Ontario. The general colour is black with a narrow whitish basal line, and a narrow whitish outer line, which broadens near inner margin. The hind wings have an outer broad whitish band; each of these is the edging of the normal black lines of *quernaria*, these lines being evident in the variety. Beneath as above, the colours a little sharper and less squamose.

London, Ontario, Canada; from Mr. Moffat.

SCIAGRAPHIA SPODOPTERATA, n. sp.

Expands 35–38 mm. Palpi, front, thorax and abdomen light fuscous to nearly white, the abdomen being darkest and sometimes interlined with black. Fore wings fuscous-white to white, the surface more or less marked with points and cross striations of fuscous; lines three, subparallel, black, equally distant, the basal and outer heavy, distinct; the middle, which is through the discal point, lighter and more variable; these lines are straight or slightly sinuous, continuing to the costa without the angle or sharp bend so generally found near costa in species nearly allied, in this respect resembling *trifasciata*, Pack. Outer margin somewhat lighter; marginal line black. Hind wings gray-fuscous stained, or with considerable fuscous striations, with a basal and extra discal black line—these

varying in intensity—the basal often, and both sometimes, obsolete. Beneath more diffusely obsolete, the lines above showing in depth of colour, but not black nor distinct.

Colo., Cala. The specimens are all females. The species is nearest to *atrofasciata*, Pack., but is much larger in size and lighter in colour.

SCIAGRAPHIA FLAVIVENATA, n. sp.

Expands 34 mm. Palpi ochreous at end and above, brownish below; front fuscous ochreous; antennæ ochreous, blackish above; thorax brownish, with a dorsal gray line, and ends of patagiæ bright orange-ochreous; abdomen with white dorsal lunule at base, the rest yellow with scattered dark scales. Fore wings blackish, ochreous, with distinct cross striations of yellow and whitish, the yellow striations more prevalent along the costa, the white on the rest of the wings, these being enough to give a banded appearance at base, intradiscally, and outwardly, the latter being more clear and somewhat uneven; veins clear deep yellow. Hind wings dirty grayish, somewhat mottled, the markings being more distinct in colour along inner margin, and at dorsal angle. Beneath dull fuscous mottled gray, a whitish line from apex to inner margin on fore wings, and a blackish extra-discal line on hind wings; all discal spots distinct.

Taken near Quebec, Canada, and sent to me by Mr. Hanham. A very beautiful insect with peculiar markings. Since writing the description I have seen another specimen from New Hampshire.

DIASTICTIS PARTICOLOR, n. sp.

Expands 28 mm. Palpi stout, ascending, rather long, end member very short, these with front dark purple, mixed with whitish; summit violet; collar purple-yellow; antennæ filiform, purplish; thorax yellow; abdomen yellow at base, becoming purplish and whitish at end, with the purple pronounced dorsally; wings yellow, somewhat stained and striated with purple or violet, the fore wings less so and brightest yellow anteriorly; cross lines scarcely suggested; discal spots prominent, pure white, surrounded with a purple clouding; outer field violet, edged within with dark purple, beginning at vein 7, running narrowly and evenly to between veins 5 and 6, then at a right angle, becoming much broader, reaching half way to cell; the inner margin then curving around to inner angle; hind wings, corresponding violet spot reaching along outer margin, limited within by a dark purple, rather broad edging, nearly straight from anterior to posterior angle; all fringes purplish. Beneath lighter, ochre

to ochre-yellow, the spots showing through in a purple shading; discal spots as above, indistinct. Legs white, fore legs and tibiæ of middle legs purplish in front.

Lake Worth, Fla.; Mrs. Slosson. A very pretty insect.

DIASTICTIS MARICOPA, n. sp.

Expands 26 mm. Palpi and front dull clay colour; thorax dull whitish; abdomen dull whitish, with intermixed darker scales; fore wings dull clay colour, with three black cross lines, each much more heavily marked at costa; the basal is rounded somewhat wavy; the other two fine, rounded, and broken, the outer being emphasized into a distinct and prominent black spot at vein 4; a marginal line of black points; hind wings rather more grayish, with black atoms, these suggesting two cross lines near the middle. Beneath nearly as above in colour, the lines faintly showing on all wings.

Arizona.

DIASTICTIS FLORIDENSIS, n. sp.

Expands 22 mm. Palpi fuscous orange-ochre, front orange-ochre; thorax fuscous ochre, with blackish scales intermixed, the end of the abdomen becoming more orange-ochre; fore wings fuscous, with an ochre tinge, squamose with fuscous points, a faint rounded outer line of darker fuscous, and a faint small spot in outer space on vein 4; hind wings bright orange-ochre, ochre along inner margin, with scattered fuscous striations, showing into a faint median line and an outer line of fuscous spots; discal spots on all wings blackish; beneath, all wings bright orange-ochre, the lines and spots showing as above and somewhat more clearly.

South Florida, from Mr. Rautenberg. I have the ♀ only, and the generic reference is provisional and doubtful.

DIASTICTIS OLIVALIS n. sp.

Expands 25 mm. Palpi heavy, drooping, fuscous ochre; front fuscous ochre; thorax olivaceous fuscous ochre; abdomen fuscous ochre. Fore wings smooth, even olivaceous fuscous, dark fuscous narrowly along costa and forming outwardly a marginal line; discal spots and lines obsolete and unsuggested. Hind wings light fuscous, with fuscous striations, making them approach the colour of the fore wings, but with scarcely an olivaceous tinge. Beneath fuscous with a violet tinge, costa and veins slightly ochreous; hind wings squamose ochre fuscous.

Without locality, in U. S. National Collection, type No. 3957.

[TO BE CONTINUED.]

OBITUARY.

Dr. Joseph Albert Lintner.

By the death of Dr. J. A. Lintner, which occurred at Florence, Italy, on May 6th, economic entomology has lost one of its oldest, ablest, and most distinguished devotees. He was of German parentage, and was born at Schoharie, N. Y., February 8th, 1822. He graduated from the Schoharie academy at the age of fifteen, and for the next thirty years was actively engaged in mercantile pursuits in New York City, Schoharie, and Utica. The study of natural history became a fascination for him early in life, and in 1853 he turned his attention especially to insects, and rendered valuable aid to Dr. Fitch, who was then making an entomological survey of the State of New York.

Dr. Lintner's first paper upon insects was published in 1862, and six years later he became zoological assistant in the New York State Museum of Natural History. He continued in the service of the State until his death, working as assistant in the Museum for twelve years, and in 1880 receiving the appointment of State Entomologist. This thirty years of continuous active service in an official capacity, in a useful and limited scientific field, and in a single State, is certainly a remarkable record, and one which speaks volumes of praise for Dr. Lintner.

He richly deserved the honour of the degree of Ph. D. conferred upon him in 1884 by the University of the State of New York. He was also honoured with the presidency of several scientific associations, and his name is enrolled among the members of many entomological and other scientific societies, both in America and in Europe. The publications of Dr. Lintner merit the highest praise, and deservedly entitle him to the foremost rank among the economic entomologists of the world. He published more than a thousand miscellaneous articles upon injurious insects, besides his four important "Entomological Contributions" and his twelve reports as State Entomologist; probably the thirteenth report, for 1897, is in the printer's hands.

These reports are justly entitled to the highest rank among the scientific publications of the great Empire State. They represent the highest ideal or model of what such reports should be, both from a scientific and a practical standpoint. For typographical neatness and scientific accuracy, for the simple, yet elegant and dignified, way in which dry scientific facts are made interesting and adapted to the understanding

of the agriculturist, Dr. Lintner's reports have not been excelled in the world's entomological literature. Such indexes as his reports contain are rare in any literature. One is still more impressed with the scientific and literary attainments of Dr. Lintner, when one understands that, practically, he never had any of the modern facilities, such as are found at many of our experiment station, for studying the habits of insects; his office was his literary sanctum, laboratory, museum, library and insectary combined.

Dr. Lintner was a man of quiet and dignified manners, always courteous and pleasant to meet in social intercourse. He was ever ready to impart from his vast fund of knowledge; and, being an impressive speaker, he always commanded the attention of scientific bodies which he was called upon to address. His frequent addresses before horticultural and agricultural societies in his own and in other States, and farmers' meetings of all kinds, were always full of information. He had recently been granted a well-earned six months' leave of absence, and was spending it in sunny Italy when the death summons came. In Dr. Lintner the agriculturists of New York found one of their best and most helpful friends, and entomologists the world over a true and sympathetic co-worker. His name well deserves a place in that list of names enshrined in the hearts of every American economic entomologist—Harris, Fitch, Walsh, LeBaron, Riley—and Lintner. M. V. SLINGERLAND.

PROFESSOR DAVID SIMONS KELLICOTT.

Professor David Simons Kellicott was born at Hastings Centre, Oswego County, N. Y., January 28, 1842, and died at his home in Columbus, Ohio, April 13, 1898. In his boyhood his frail constitution and delicate health required him to spend much of his time out of doors, and it is to this, no doubt, that, in part at least, his love for nature may be traced. He graduated from Syracuse University with the degree of B. Sc., while the institution was yet known as Genesee College; teaching one year in Southern Ohio, prior to his graduation. After graduating, he taught one year in Kingston Normal School, Pennsylvania, after which he was connected for seventeen years with the State University at Baffalo, N. Y., being Dean of the College of Pharmacy and also Professor of Botany and Microscopy. He came to the Ohio State University in 1888, where for ten years he has occupied the chair of Zoology and Entomology. At the time of his death he was General Secretary of the American Association for the Advancement of Science, President of the American Microscopical Society, and Treasurer of the Ohio Academy of

Science. He had served as President of the Buffalo, N. Y., Academy of Science and the Ohio Academy of Science.

Animal Parasites of Fishes, and the Rotifera, from time to time claimed a considerable portion of Professor Kellicott's attention, but his entomological work won for him the admiration of the entomologists of America. Patient, conscientious and utterly devoid of selfishness, he was one of the most kind and lovable men the writer has ever met. Faithful and just with his colleagues and the idol of his pupils, seeking patiently and industriously after the truth, he won esteem while living, and in his death he has left numberless friends to mourn his loss. If there was ever a man who deserved the reward, "Well done, thou good and faithful servant," that man was David S. Kellicott; and the fruits of his labours will stand as an enduring monument to his faithfulness among his fellow-men. He began to contribute to the CANADIAN ENTOMOLOGIST in 1878, his last article appearing in 1896. F. M. WEBSTER.

BOOK NOTICES.

A TEXT-BOOK OF ENTOMOLOGY, INCLUDING THE ANATOMY, PHYSIOLOGY, EMBRYOLOGY, AND METAMORPHOSES OF INSECTS, FOR USE IN AGRICULTURAL AND TECHNICAL SCHOOLS AND COLLEGES, AS WELL AS BY THE WORKING ENTOMOLOGIST.—By Alpheus S. Packard, M. D., Ph. D. New York: The Macmillan Company, 66 Fifth Avenue; 1898. Price, $4.50.

The book is primarily divided into three parts: Part I. being devoted to Morphology and Physiology, Part II. to Embryology, and Part III. to Metamorphoses. Under these divisions Dr. Packard treats his subject as follows: Position of Insects in the animal kingdom; Relation of Insects to other Arthropoda; Insecta (Hexapoda); The Head and its Appendages; The Thorax and its Appendages; The Abdomen and its Appendages; The Armature of Insects; The Colours of Insects; Muscular System; Nervous System; Sensory Organs; Digestive Canal and its Appendages; Glandular and Excretory Appendages of the Digestive Canal; Defensive or Repugnatorial Scent-Glands; Alluring or Scent-Glands; Organs of Circulation; Blood Tissue; Respiratory System; Organs of Reproduction; Development of the Egg, Larva, Pupa, and Imago; Hypermetamorphism; Summary of the Facts and Suggestions as to the Causes of Metamorphism.

The volume contains 729 pages, including a carefully prepared index, 654 figures and numerous valuable bibliographical lists. We certainly have nothing in the way of entomological literature in this country that will cover the field of development of insects as will this last work of Dr. Packard. Not only the teacher and student, but the educated men and women of the world at large who may desire to know more of the anatomy, physiology and metamorphoses of insects, will find in this work the very aid that is most desired. With this work and some other like Comstock's Manual, any student of ordinary ability can begin at the very foundation of entomology and work his way upward fully as easily as has heretofore been possible in zoology. The advent of this work certainly marks the trend of entomological studies in America. In future, except in some particular groups, we are to have less species-making and more studies of the development and transformations of those already well known in the adult stage, as well as of their inter-relations with each other and with other organisms about them. We shall not study dried corpses alone, but life in connection therewith, and the possession of pinned specimens of the adults in our cabinets will only increase our desire to know more of the problems of their existence. F. M. W.

Araneæ Hungariæ.—By C. Chyzer and L. Kulczynski.

The last part of Vol. II. of this important work has just been published (Jan., 1898), and completes the account of the Hungarian spiders. This part is of two hundred pages, and five plates, and contains the families Zodarioidæ, Agalenoidæ, Drassoidæ, Zoropseoidæ, Dysderoidæ, Filistatoidæ, Calommatoidæ, Theraphosoidæ, and an appendix with additions to previous parts of the work. Nearly 800 species are treated; and in this part forty spiders are described as new, thus showing how much there is yet to be done in a well-known part of Europe. In a systematic way the authors have closely followed Thorell. Tables are given for the separation of genera and species, which are useful to the American student in indicating lines of systematic work in this country. For clear definition of species the work is, I believe, the best that has ever been written. N. B.

The twenty-eighth annual report of the Entomological Society of Ontario for 1897 has recently been issued by the Department of Agriculture. It consists of 104 pages, and is illustrated by 56 wood cuts and 2 plates. One of the latter gives an inside view of the Society's library and cabinets, with the well-known figure of Mr. J. Alston Moffat, the librarian and curator. The picture is reproduced from a photograph kindly taken by Mr. R. W. Rennie, of London.

Mailed June 2nd, 1898.

The Canadian Entomologist.

Vol. XXX. LONDON, JULY, 1898. No. 7.

THE IMPORTATION OF THE SAN JOSE SCALE, ASPIDIOTUS PERNICIOSUS, FROM JAPAN.

BY F. M. WEBSTER, WOOSTER, OHIO.

In *Entomological News*, Vol. IX., pp. 95–96, Mr. T. D. A. Cockerell states that Mr. Alexander Craw, quarantine officer at San Francisco, California, had "two or three times" found *Aspidiotus perniciosus* on trees from Japan, and, notably, on a plum tree that arrived January 25th, 1898.

On April 29th, 1898, the writer found *A. perniciosus* with *Diaspis amygdali* on Japan white semi-double Flowering Cherry, received direct from Japan during the winter of 1896–97, the trees having been planted out in an isolated locality during the latter part of April, 1897, and though having been growing in America for nearly or quite a year, their location was sufficient proof that they could not, by any possible chance, have become infested in this country. Only a part of the trees were infested, and these but slightly, the scale being more abundant near the surface of the ground and diminishing in numbers upward, while there were none to be found on the branches. The trees were small, being only about a half inch in diameter at base.

A lot of stock, belonging to the same varieties as those above mentioned, *Prunus pandula* and *P. pseudo-ceraceus*, that had also been imported directly from Japan and from the same firm, but during the winter of 1897–8, was then examined. Unlike the first lot, these trees had never been removed from the storehouse where they had been removed from the boxes in which they were imported. These trees were smaller than the others, having evidently been arch grafted, on older stock of some variety of cherry, by cutting off the original top and leaving a stump about six or eight inches in height and an inch or more in diameter, the cleft for the insertion of the graft being made after the usual manner, but instead of using a scion in the ordinary way, a young growing shoot of the flowering cherry had been inserted into the cleft at one side of the stump at the top, and the juncture covered with grafting

wax, the shoot, however, not being severed until after it had united with the stump, when it was cut off just below the juncture, thus greatly facilitating the growth of the graft, as it could draw its nourishment from the parent stock until it had firmly united with the new. These old stocks or stumps were much more seriously infested with the San José scale than the younger wood, averaging from one to six individuals to the square inch of bark surface, but extending upwards on the young growth well toward the extremity. On the old wood many of the scales were dead, but there were plenty of live ones and it was impossible to determine whether or not the dead had been parasitized, partly eaten by carnivorous enemies, or crushed in the handling of the stock, but that this was a direct importation does not admit of a doubt.

Mr. Cockerell thinks that the San José scale may probably be a native of the more or less elevated regions of Japan, the species of scale insects found there near the sea level seeming to belong to oriental tropical types. It was impossible to learn the exact locality where the stock examined by me had been propagated, but there were certainly no indications of immunity to the attack of this scale, though the trees might, perhaps, have withstood the attack better and survived longer, but, judging from all that could be observed from the actions of the scale on the importation of 1896–7, without the influences of natural enemies, it would spread as rapidly on a tree from Japan as it would on one from America, and this raises the question as to why, if it occurs in Japan, as it certainly does, this scale does not become as destructive there as with us in America. If this immunity is not due to resistive powers of the stock, and I certainly believe, from what I saw in these cases, it is not, then the protection must come from the influences of natural enemies, which is of itself the best possible proof that Japan is the native home of *Aspidiotus perniciosus*, and that we have a case parallel with that of the introduction of the Cottony-cushion scale, *Icerya purchasi*, into California from Australia. We have imported the San José scale and left behind its natural enemies that hold it in check in Japan, and while we cannot tell just what these enemies are, if the scale is a native of that country we have probably been importing it for years, and in that case, if the enemies were of a fungous nature, or internal feeders, we should have gotten them with their host insect long ago. It seems probable, then, that these enemies, or at least the one that is holding this scale in check, is one that is easily separated from its food and has for this reason been left

behind in the importation of fruit and ornamental stock upon which the scale has occurred. The overwhelming success that followed the introduction of the Australian lady beetle, *Novius cardinalis*, and the suppression of the Cottony-cushion scale might not again be repeated in the case of the San José scale, as, in case of a successful introduction of its natural enemies, its wide diffusion over the country would render its suppression much more difficult, but it would now seem that we have in our possession information enough to indicate very strongly that in Japan *Aspidiotus perniciosus* has natural enemies, which, if brought to this country and distributed in infested orchards and places where the scale exists, would sooner or later overcome this pest and hold it in check thereafter. We have accomplished this once and saved from ruin an immense industry, starting with even less prospects of success than we now have in the case of the San José scale. A competent entomologist located in Japan, for perhaps a year, would solve the problem, as within that time he would be able to study the San José scale and its enemies over a considerable area of country, and if such enemies were transmittible, and we have no reason to suppose that they are not, arrangements could be made to have them transmitted in quantity to the various Experiment Stations in this country in the States where the scale is known to occur. From a scientific standpoint, there does not appear to be a single significant obstacle in the way of again carrying out this plan of introducing from a foreign country the natural enemies of an insect that has been introduced with the plants upon which it depredates, while these natural enemies, owing to their habits, have been left behind.

Financially speaking, there ought to be no question as to the value to the country of the benefits to be derived from this importation, in case it is found to be practical. Even if it should fail, which must be reckoned among the possibilities, but not by any means among the probabilities, the financial loss would be but a mere bagatelle for either Canada or the United States, or even a single State, for that matter.

The total expense of sending Mr. Koebele and myself to Australia (See reports U. S. Commissioners to Centennial Exhibition at Melbourne, 1888, p. 78) in 1888–89, exclusive of salaries, was exactly $1,694.97. With $2,000 or $2,500 at his disposal, an entomologist would be able to accomplish all that I have indicated, provided, of course, that he was already a salaried officer and his pay was continued by the institution with which he was connected. There are two widely separated town-

ships in Ohio, in either one of which the San José scale has done injuries that would amount to the larger of these sums, if not even more, and the Province of Ontario is probably spending fully as much in trying to exterminate the scale in some of the localities where it has already obtained a foothold.

TWO NEW SPECIES OF KERMES FROM KANSAS.

BY E. E. BOGUE, STILLWATER, OKLAHOMA.

Kermes pubescens, Bogue, n. sp.

♀ scale spheroidal, 3½ mm. in diameter, 3 high; pointed and grooved beneath; covered all over with short straggling whitish pubescence. Colour rather light brown, with more or less obscure and suffused dark brown bands marking the obsolete segments. Surface shining, with minute concolorous specks, but no dark spots or pits.

Hab.—On twigs and leaves of oak (*Quercus macrocarpa* and *Q. prinoides*), at Manhattan, Kansas. Collected by Mr. J. B. Norton. Mr. Norton reports that this does considerable damage to *Quercus macrocarpa*. It occurs very thickly on the young twigs and leaves.

"Allied to such species as *K. galliformis*, but very distinct by its pubescence, dark colour with suffused markings, and comparatively small size." (Ckll. in litt.)

The following species, also found by Mr. Norton, has been described by Mr. Cockerell, who sent his MS. to be included in this article.

Kermes concinnulus, Ckll., n. sp.

"♀ scale 4 mm. long, 4½ broad, 3½ high; very convex, rounded in front, more or less flattened behind; flattened beneath, except a median anterior keel-like prominence. Colour lively ochreous. Surface shining, not speckled with black; segmentation very distinct, the sutures marked by bands and spots of dark brown and black, on the hind part by numerous pits. A median longitudinal groove, where the segmentation is obsolete, also partly marked out in black. Sutures not deep, nor are the segments strongly gibbous on each side of the median groove.

"Skin with many small round glands. Antennæ and legs very minute, short and stout.

"Antennæ bristly at tip, joints obscure." (Cockerell MS.)

Hab.—On oak (*Quercus macrocarpa*), at Manhattan, Kansas. Collected by J. B. Norton. Allied to *K. Cockerelli*, Ehrhorn, ined.

NOTES ON SOME SAWFLY LARVÆ, ESPECIALLY THE XYELIDÆ.

BY HARRISON G. DYAR, PH. D., WASHINGTON, D. C.

MACROPHYA FLAVICOXÆ, Nort.

Head light brown, almost orange on the vertex, a little dot at occiput, eye in a black spot; width, 1.8 mm. Body greenish white, not shining, a dusky black dorsal stripe and a very distinct velvet-black lateral one, broken into two square patches situated on the third and fifth annulets, connected by smoky shadings. The spots are broken up posteriorly and absent on joint 13. Dorsal band greenish black. Segments neatly annulate, feet on joints 6–12 and 13; anal plates immaculate. Towards the end of the stage the segments are faintly orange banded in the middle (on second and third annulets), the anal flap broadly orange.

Ultimate stage.—Head brownish with blackish apical shade, eye black. Body shining greenish waxen, no marks except the orange bands which persist rather distinctly, covering four annulets, apparently first, second, third and seventh, the segments 7-annulate, marked a little with tar-brown in the folds. Single brooded; found on the red-berried elder *(Sambucus racemosa)* at Jefferson Highlands, N. H., towards the end of July, resting curled on the back of the leaf. The larvæ pass the winter in cells in the earth. One ♂ specimen was bred, which was submitted to Mr. MacGillivray, who labelled it with doubt, "n. sp., near *flavicoxæ*." I prefer not to consider it distinct for the present. The specimen is in the U. S. National Museum, marked "6 L."

MACROPHYA EXTERNA, Say.

Stage III. (?)—Head pale testaceous, a little darker on the vertex, a large black spot covering the eye; width, .9 mm. Body tapering posteriorly, finely annulate, translucent white; no marks, the dorsum appearing green from the food. Thoracic feet colourless; abdominal ones on joints 6–12 and 13.

Stage IV.—Head whitish, eye black, a dark shaded spot on the vertex; width, 1.2 mm. Thorax enlarged; body white, finely 7-annulate, the dorsum green from food.

Stage V.—Head whitish, eye in a large black spot, a large smoky black patch on vertex; width, 1.6 mm. Body rather opaque white, neatly 7-annulate, the food green; no marks. The larva curls with the tail raised over the back. Sits on the under side of the leaf.

Stage VI.—Head shining white, a large black patch covering, but mostly behind, the eye; a rounded grayish black patch on vertex, finely white punctured; width, 2.1 mm. Body white, dorsal and subdorsal broad blackish olive shade bands on joints 2–13; anal plate black. Abdomen neatly annulate; feet all white.

Stage VII.—Head as before, but slightly pruinose; width, 2.5 mm. Dorsum to spiracles black, leaden or greenish centrally, the colour diluted on joint 2 anteriorly and before the black anal plate. Feet all white; a black patch on the lower subventral fold. Segments neatly 7-annulate.

Stage VIII. (ultimate). — Head sordid pinkish, waxen, shining; width, 2.4 mm. Body the same colour, with a darker dorsal band and broken lateral one; segments 7-annulate.

Single brooded, forming cells in the earth. Found on the hickory at Bronx Park, N. Y., and Bellport, Long Island, during July.

Determined by Mr. Ashmead, from one bred ♀, as a variety of *M. externa*. Specimen labelled "8 P."

According to Mr. W. H. Ashmead's classification, the described species of Xyelidæ are as follows:

MACROXYELA, Kirby.

1. *ferruginea*, Say.
2. *tricolor*, Nort.
3. *infuscata*, Nort.
4. *aenea*, Nort.

MEGAXYELA, Ashmead.

5. *major*, Cress.

PLEURONEURA, Konow.

6. *aviingrata*, Dyar.

MANOXYELA, Ashmead.

7. *californica*, Ashm.

XYELA, Dalman.

8. *minor*, Nort.

Genus MACROXYELA.

The larvæ of this genus are all unknown. The long ovipositor of the ♀ suggests an internal feeder.

Genus Megaxyela.

The larvæ of *M. major* proved hard to rear, and only imperfect specimens were obtained ; but the identification is nearly certain.

The larvæ are exposed feeders, gregarious on the young leaves of hickory in May, conspicuously coloured yellow with black spots. Both thoracic and abdominal feet are present, but are very small and hardly functional, the larvæ resting curled around a portion of leaf or stem, and wriggling about with the help of a few inconspicuous threads of silk.

Egg cuts irregular, somewhat distant, each a yellowish area on one side of the midrib ; the upper epidermis partly separated and brownish in an area of nearly 3 mm. ; lower epidermis a little swollen and yellowish in this area. No distinct cut, remaining after the larvæ hatch.

Stage II.—Head black, with long antennæ ; width, .6 mm. Body whitish yellow, with black tubercles as in the next stage.

Stage III.—Much as in the next stages, the anal plate elevated and black, but no black spot on joint 13, the upper two spots of third annulet joined. Width of head, .8 mm.

Stage IV.—Head, 1.2 mm. The same ; there is no black mark on the cervical shield.

Stage V.—Head, 1.8 mm. The same.

Stage VI.—Head rounded, prominent, proportionately small ; antennæ long, 5-jointed ; shining black, antennæ and palpi white ringed in the joints ; width, 2.2 mm. Body segments 4-annulate, the first a small dorsal arc, the rest large, reaching subventral folds ; spiracle on second. Colour, opaque shining yellow, a little clearer in the folds of the annulets. A black cervical mark, truncate before, widened and trilobate behind ; thoracic feet, a large patch on joint 13 anteriorly, besides the anal flap on its entire upper side, including the punctured, swollen, suranal prominences and the tubercles, shining black. Tubercles rather large, but slightly elevated, minutely piliferous ; four on second and third annulets above spiracle, two on fourth annulet, lateral, and one on each subventral fold. A faint dorsal, blackish shade between the uppermost tubercles, sometimes distinct. Abdominal feet small on joints 6–12 and 13. Single brooded, no ultimate stage. The larvæ leave the trees by the end of May, enter deeply into the earth, and form fragile cells.

Genus Pleuroneura.

I have elsewhere described the larva of *P. aviingrata*, with the structure and habits of the preceding, but solitary and coloured to resemble the excrement of birds.

Genus Manoxyela.

Unknown in the larval state, but not improbably similar to the next.

Genus Xyela.

The imago of *X. minor* is found abundantly on the pine (*Pinus virginiana*) very early in the season, in February and March, in the vicinity of Washington, D. C. The larva (or what I believe to be the larva, as it has not yet been bred) occurs in the staminate aments of this tree, feeding concealed, but not a true internal feeder, as it does not attack the stem or bracts, so far as I can make out, except to form an aperture at emergence. Probably they feed on the young pollen. The larvæ leave the aments before they blossom, during April, drop to the ground, which they enter for some distance to form hibernating cells. There is but one brood in the year, the April larvæ yielding the imago the following February.

Larva.—Head small, rounded, nearly white, faintly brownish, especially around the mouth, eye very small, black; antennæ distinct and quite long; width about .4 mm. Body subcylindrical, venter a little flattened; subventral folds moderately distinct. Thoracic feet short and conic, functionless; abdominal ones wanting. Segments obscurely 3-annulate; anal plate round, slightly projecting, somewhat cornified and brownish, smooth; joint 13 slightly transversely ridged, sloping posteriorly. Thorax somewhat thickened, the whole body quite robust. All opaque white, waxy, no marks. The skin is transparent, but the alimentary canal lined with fat-granules produces the opacity.

From the foregoing a definition of the Xyelid larva would read as follows: Sawfly larvæ with prominent head and moderately long, distinct antennæ. Thoracic feet reduced; abdominal ones rudimentary or absent, number as in the Tenthredininæ. Segments with few annulets (three or four), the tubercles, when present, several haired and situated in two and a half rows transversely on the spiracular and two following annulets; the half row the most posterior.

Apparently most nearly allied to the Lydiidæ, but without the anal stylets, and spinning little or no silk.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 2.)

Series I.—Xylophaga.

Family I.—Oryssidæ.

This group was recognized as a sub-family by Newman as early as 1834, and as a distinct family by Haliday in 1839. It is represented at present by a single genus, *Oryssus*, Latr., which is apparently the stem from whence some of the parasitic Hymenoptera originated; *i. e.*, the Megalyridæ, Stephanidæ, etc.

I have now, however, the pleasure of indicating below another genus, indigenous to Africa.

Although comparatively few species are described in the group, it yet appears to be widely distributed, species having been found in North, Central and South America, Europe, Africa, Asia and Aru, in the Malay Archipelago.

After I had sent my MS. of this family in for publication, I found that Mr. F. W. Konow, in his paper entitled "Systematische und Kritische Bearbeitung der Siriciden—Tribus Oryssini,"* which I had not seen, had already given a revision of the genera. In this valuable contribution, Konow recognized four genera, three of which were here described for the first time. One of these, *Chalinus*, I had also indicated as new in my table under the name of *Chrysoryssus*, based upon a specimen of *Oryssus imperialis*, Westwood, in the National Museum, taken by Mr. Rolla P. Currie, March, 1897, at Mount Coffee, Liberia, Africa. It is one of the most brilliant of phytophagous insects, resembling in its metallic green colour many of the Chrysids.

The genera *Ophrynopus* and *Mocsarya* are unknown to me; the former occurs in Mexico, South America, and Aru, the latter being represented by a single species, *M. metallica*, Moes.; from Sambawa, Sunda Island.

The four genera recognized by Konow may be easily distinguished by the aid of the following table:

Table of Genera.

Face without carinæ; body not metallic.....4.
Face with 2–4 carinæ; body usually metallic.....2.

* Természetrajzi Füzetek, etc., XX., 1897, p. 602.

2. Facial carinæ 2–4 and *divergent* anteriorly.....3.
Facial carinæ 2 and *convergent* anteriorly.
Submedian cell in hind wings shorter than the median, the transverse median nervure joining the median vein before the origin of the cubitus, the discoidal transverse nervure present; anterior tibiæ with a deep emargination just before apex; hind tibiæ with the outer edge serrate..... *Chalinus*, Konow.
3. Face bicarinate; discoidal cell petiolate; lanceolate cell widely contracted..... *Ophrynopus*, Konow.
Face quadricarinate; discoidal cell sessile; lanceolate cell petiolate..... *Mocsarya*, Konow.
4. Front wings with the lanceolate cell longly contracted; submedian cell in hind wings much longer than the median, the transverse median nervure uniting with the median vein far beyond the origin of the cubitus; transverse discoidal nervure always wanting. *Oryssus*, Latreille.

Oryssus, Latreille.

The following is apparently an undescribed species new to our fauna:

Oryssus thoracicus, n. sp.—♂. Length, 4.75 mm. Head, antennæ except the first five joints, the apical joint at apex, and the abdomen are black, the thorax, first five joints of antennæ with the apex of the last, and the legs, red; the anterior tibiæ beneath are dusky with a white streak at base; the middle tibiæ have a white streak behind; while hind tibiæ are blackish, with a white streak at basal half behind. The wings are subfuscous, paler toward base.

Hab.—Santa Cruz Mts., California.

Described from a single specimen.

FAMILY II.—SIRICIDÆ.

This family is also widely distributed throughout the world, although represented by comparatively few genera. The family may be separated into two subfamilies as follows:

Table of Subfamilies.

First transverse cubitus usually originating from the basal nervure; hind wings with a complete anal cell; hind tibiæ with two apical spurs..... Subfamily I., Siricinæ.
First transverse cubitus not originating from the basal nervure, but from the cubitus; hind wings without a complete anal cell; hind tibiæ without or with only one apical spur..... Subfamily II., Tremecinæ.

Subfamily I.—SIRICINÆ.

Table of Genera.

Third joint of antennæ usually a little shorter than the fourth or not longer; process of the last dorsal abdominal segment long, widened before apex; head more or less marked with yellow or white ..... *Sirex*, Linné.

Third joint of antennæ longer than the fourth; process of the last dorsal abdominal segment shorter, triangular, and equally thickened to apex; head wholly black or blue-black..... *Paururus*, Konow.

Paururus, Konow.

To this genus belong *Urocerus Abbottii*, Kirby; *U. apicalis*, Kirby; *U. cyaneus*, Fabr.; *U. Edwardsii*, Br.; *U. gracilis*, Westw.; *U. hirsutus*, Kirby; *U. nigricornis*, Fabr.; and *U. zonatus*, Nort.

The following is new:

Paururus pinicolus, n. sp.—♀. Length to tip of process, 18–19 mm.; to tip of ovipositor, 23–24 mm. Head, thorax and dorsal abdominal segments 1–4, or at least more or less of the fourth, especially at the sides, all ventral segments, sheaths of the ovipositor, and the legs, blue-black; rest of abdomen red. Process triangular, serrated at sides, its tip and beneath blackish. Wings dark fuliginous; the costal vein to stigma and the stigma within, ferruginous; rest of veins black or piceous. Antennæ 19-jointed, black, a little longer than the head and thorax united. The head and thorax are closely punctate, opaque and well clothed with black pile.

Hab.—Jacksonville, Fla.; Washington, D. C.; and Morgantown, W. Va.

The specimens from West Virginia were sent me by Prof. A. D. Hopkins, who informed me he took them boring in pine (*Pinus*, sp.). The others were captured by myself in November and December, several years ago.

Subfamily II.—TREMECINÆ.

Table of Genera.

Front wings with four submarginal cells..... 2.

Front wings with three submarginal cells.

Antennæ filiform, multiarticulate, the third joint longer than the fourth; tarsi slender, cylindrical, the basal joint of hind tarsi shorter than their tibiæ..... ....*Xeris*, Costa.

Antennæ short, filiform, 5- or 6-jointed, the third joint shorter than the fourth ; basal joint of hind tarsi longer than their tibiæ,much flattened and produced outwardly at apex beyond the second joint.. ..... *Teredon*, Norton.

2. Antennæ short and equally thickened or somewhat thicker before apex, the third joint usually a little shorter than the fourth, or at least no longer ; hind tarsi dilated in ♂ ..... *Tremex*, Jurine.

Xeris, Costa.

To this genus belong *Urocerus caudatus*, Cr., and *U. Morrisoni*, Cr.

Family III.—Xiphydriidæ.

Most European and American writers have placed these insects with the Siricidæ, but their *habitus* is quite different, and the characters used in my table readily distinguish them from the true horntails.

The Swedish entomologist, C. G. Thomson, in 1871, first separated them from the *Siricidæ* as a distinct tribe, and in this he has been followed by Cameron and Konow.

I have recognized two subfamilies separated as follows :

Table of Subfamilies.

Front wings with one submarginal cell..... Subfamily I., Derecyrtinæ.
Front wings with two submarginal cells..... Subfamily II., Xiphydriinæ.

Subfamily I.—Derecyrtinæ.

This group is represented by a single genus, known at present to occur only in Central and South America.

Front wings with four submarginal cells..... *Derecyrta*, Smith.

Subfamily II.—Xiphydriinæ.

Three distinct genera are now recognized in this group, all being found in our fauna. They may be separated as follows :

Table of Genera.

Front wings with three submarginal cells..... 2.
Front wings with four submarginal cells.

Lanceolate cell contracted beyond the base and closed..... *Brachyxiphus*, *Philippi.*

Lanceolate cell subcontracted, but still open... *Xiphydria*, Latreille.

2. Lanceolate cell contracted and uniting beyond the base ..... *Konowia*, Brauns.

Family IV.—Cephidæ.

This group was first treated as a distinct family by that master systematist, A. H. Haliday, as early as 1839.

Dr. Von Dalle Torre has credited the group to Westwood, evidently without having observed that Westwood, in his Introduction, merely accepted the views of Haliday, treating the group, however, as a sub-family instead of a family.

The genera have been recently tabulated by Konow as follows :

Table of Genera.

First joint of flagellum not or scarcely longer than the second, the flagellum towards tip more or less clavate.....5.

First joint of flagellum distinctly longer than the second, the flagellum towards tip not thicker than at base.

Hind wings with a complete cubital cell ; hind tibiæ with one or two spurs before tip.....2.

Hind wings without a complete cubital cell ; hind tibiæ without spurs before tip ; last ventral abdominal segment in ♂ without an emargination.....*Caenocephus*, Konow.

2. Antennæ thickened at the middle.....3.

Antennæ filiform, uniformly thickened, or with joints 3–5 slightly compressed.....4.

3. Abdomen short and thick, at the most about half the length of the thorax ; antennæ shorter than the head and thorax united, distinctly thickened before tip ; last ventral segment in ♂ ending in a short thickened knob, produced upwards into a distinct process, the penultimate ventral segment normal.....*Pachycephus*, Stein.

Abdomen long, fully twice as long as the thorax ; antennæ longer than the head and thorax united, feebly thickened at the middle ; last ventral segment in ♂ emarginate at apex, the penultimate with a transverse impression, clothed with erect black bristles...*Syrista*, Konow.

4. Hind tibiæ with a single spur before the tip ; antennæ with joints 3 and 4, and sometimes 5, compressed, the following to apex, of nearly an equal thickness.....*Macrocephus*, Schlecht.

Hind tibiæ with two spurs before the tip ; antennæ rather slender, filiform.....*Janus*, Stephens.

5. Pronotum quadrate, longer than wide, with the head thickly punctured, flat, scarcely emarginate behind ; antennæ long, very feebly thickened toward apex ; hind tibiæ usually with only one spur before the tip.....*Calameuta*, Konow.

Pronotum transverse.

Hind tibiæ with two spurs before the tip.....6.

Hind tibiæ without or with only one spur before the tip.....8.

6. Sheaths of ovipositor, seen from above, narrow, pointed, or of an equal breadth to tips; penultimate ventral segment in ♂ without, or at the most with a small brush-like apparatus .....7.

Sheaths of ovipositor, seen from above, broadened toward tips; two penultimate ventral segments in ♂ with brush-like bristles.....*Astatus*, Panzer.

(? = *Eversmannella*, Jukowlew.)

7. Sheaths of ovipositor of an equal breadth or pointed at apex; ♂ with the two penultimate ventral segments convex without foveæ .....*Cephus*, Latreille.

Sheaths of ovipositor broadened toward apex; ♂ with the two penultimate ventral segments swollen before the hind margin, with foveæ filled with stiff bristles..... *Trachelus*, Latreille.

8. Hind tibiæ with one spur before the tip; ventral segments of ♂ normal, without special characters.....*Monoplopus*, Konow.

Hind tibiæ without a spur before the tip; three penultimate ventral segments in ♂ clothed with stiff brush-like bristles..*Ateuchopus*, Konow.

Cephus, Latreille.

Cephus Graenicheri, n. sp. — ♀. Length, 11 mm. Black, shining; antennæ 20–jointed, very slightly but gradually thickened toward apex; clypeus, except a median black spot anteriorly, a line beneath the eyes, mandibles except teeth, palpi except the terminal joints, which are dusky, a spot on front of tegulæ, two spots beneath on the upper angles of episternum and mesopleura respectively, spots on the anterior and middle coxæ, and the hind coxæ, except a black spot within, yellow; rest of legs, except all the trochanters, tips of the joints of the anterior and middle tarsi with their terminal joint entirely, apex of hind tibiæ and their tarsi, which are black or fuscous, reddish-yellow. Wings smoky hyaline, the costa and the stigma yellowish, the latter with a longitudinal dusky streak within; rest of veins black or blackish. Abdomen longer than the head and thorax united, compressed, black, with bands and blotches polished, shining, impunctured, except some sparse, rather coarse punctures on the first dorsal segment above, and some closer punctures laterally at base of the second segment; the second segment has an obscure rufous spot on each side at base; the third has a narrow

yellowish band at base, shading into rufous at apex; the fourth has a yellowish blotch laterally towards the ventral surface; the fifth is narrowly yellowish at base, but laterally broadening to the venter, so that at the sides near the venter, except an irregular triangular black mark which encloses the spiracles, it appears almost entirely yellow; the dorsal or apical part of the segment is rufous; the sixth has two small yellowish marks above, but below or at the sides from the spiracles it is yellow; the seventh, except a spot at sides close to the venter, is black; the eighth is mostly black, with a large yellow spot at the reflexed apex, and a yellow spot on the margin just below it; venter black, except the terminal segment laterally at apex and the margins of the hypopygium, which are yellow; hind tibiæ with two spurs before apex.

Hab.—Milwaukee, Wisconsin.

Described from a single ♀ specimen taken by Dr. Sigmand Graenicher, and in honour of whom the species is named.

THE DESCRIBED SPECIES OF XIPHIDIUM IN THE UNITED STATES AND CANADA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The following table, made as simple as possible, and based almost exclusively upon the female sex, will serve to distinguish the species of Xiphidium hitherto described or recorded from the United States and Canada. It includes only the species of Xiphidium proper; *i. e.*, those of slender form with straight or nearly straight ovipositor, excluding the stouter species with distinctly arcuate ovipositor, commonly referred to Orchelimum, though both are classed together by Redtenbacher.

Table of the Described Species of Xiphidium.

a^1 Under side of hind femora armed with several spines; ovipositor longer than hind femora ..... *ensiferum* Scudder.

a^2 Under side of hind femora with at most a single spine.

b^1 Ovipositor at least half as long again as hind femora.

c^1 Tegmina much longer than body ..... *attenuatum* Scudder.

c^2 Tegmina no longer than body.

d^1 Tegmina nearly or quite covering the abdomen ..... *Scudderi* McNeill.

d^2 Tegmina scarcely longer than the pronotum ..... *strictum* Scudder.

b^2 Ovipositor at most but little longer than the hind femora.

c^1 Ovipositor as long as or longer than the hind femora.

d^1 Tegmina covering or almost covering the abdomen ..... *nigropleura* Bruner.

d^2 Tegmina hardly or not longer than the pronotum ..... *saltans* Scudder.

c^2 Ovipositor distinctly shorter than the hind femora.

d^1 Tegmina much longer than the body, and wings still longer ..... *fasciatum* DeGeer.

d^2 Tegmina not reaching tip of abdomen, and wings still shorter.

e^1 Ovipositor nearly or quite straight, and fully three-fourths as long as hind femora.

f^1 Larger; hind femora nearly or quite 16 mm. long. Ovipositor attenuate at tip as much by the curve of the upper as of the under edge ..... *gossypii* Scudder.

f^2 Smaller; hind femora hardly or not exceeding 13 mm. in length. Ovipositor attenuate at tip by the curve of the under edge only ..... *brevipenne* Scudder.

e^2 Ovipositor distinctly though feebly arcuate, and less than three-fourths as long as the hind femora ..... *nemorale* Scudder.

It may be added that *X. modestum* Bruner (March, 1891), and *X. taeniatum* Redtenbacher (July, 1891), are synonyms of *X. saltans* Scudder (1872); and *X. curtipenne* Redtenbacher (1891), the same as *X. nemorale* Scudder (1875).

PHILANTHUS HENRICUS—(P. 153).

This species should be credited to Mr. Dunning alone; I neither described nor named it. I did send Mr. Dunning a few Philanthidæ, with MS. names and descriptive notes, and these, in the event of publication, should be credited jointly; but *P. henricus* is not my species in any sense. The type specimen, I should add, was collected by Professor Townsend.

T. D. A. Cockerell.

SOME NEW SPIDERS.

BY NATHAN BANKS, WASHINGTON, D. C.

Pœcilochroa minuta, n. sp.

Length ♂, 4 mm.; ceph., 1.7 mm. long, 1.1 broad, patella plus tibia IV., 1.6 mm. Cephalothorax uniform reddish yellow, legs and palpi a trifle paler, except metatarsi IV. which are reddish brown; sternum yellowish; abdomen black, with short white hairs and some longer black ones at base; venter with a pale streak each side; spinnerets red-brown. Head narrow; posterior eye row slightly recurved, longer than anterior row, the P. M. E. round, their diameter apart and as near the P. S. E. as to each other, equal in size; eyes of anterior row subequal, all close together. No plate under fang of mandibles. Legs quite hairy, but the scopulas not dense; femora with three or four very large spines above, each spine longer than the posterior eye row; no spine above on tibia IV., one below at tip of tibia I. Sternum narrow, nearly twice as long as wide. Abdomen slender, no wider than cephalothorax, spinnerets large, an interrupted ventral fold near their base. The tibia of the male palpus has on the outer tip a large, stout, slightly curved projection one-half the length of the tarsus and blunt pointed at tip; the palpal organ is swollen near middle, the style is short.

One male; Brazos Co., Texas.

Cybœodes (?) incerta, n. sp.

Length ♀, 4.5 mm. Cephalothorax brownish yellow, darkest in front and black around each eye; mandibles rather darker than cephalothorax; legs and sternum pale yellowish, abdomen pale gray, thickly clothed with rather long white hairs and longer black bristles, mostly at base. Cephalothorax once and a half longer than wide, broad and low in front. Eyes in two rows close to each other, hind row about straight, longer than the anterior row; the posterior eyes larger than the anterior eyes; P. M. E. closer to equal P. S. E. than to each other; A. M. E. about as close to each other as A. S. E., dark coloured. Clypeus narrow; mandibles large, porrect, slightly divergent, front margin with three teeth, hind margin with two smaller teeth, fang long and stout; maxillæ twice as long as broad, rounded at tip, scarcely inclined, plainly obliquely impressed; lip longer than broad, rounded at tip. Sternum longer than broad, truncate in front, sides rounded; legs rather large, of moderate length; all femora shorter than the cephalothorax, clothed with hairs and spines, tibia I. with one spine near base, two towards tip; metatarsus I.

with two near base, two near middle, and one at tip ; tibia II. with one at base and one towards middle, three under metatarsus II.; tibiæ III. and IV. with (under) two very long ones at base, two long ones at middle, and two much shorter at tip ; above with several ; metatarsi with many long and stout spines ; three claws, the pair with teeth below. Abdomen once and a half longer than broad ; spinnerets are before the tip, two-jointed, lower pair the longest, at base between them is a hump, and at base of this is a transverse furrow ; the epigynum shows a short, spoon-shaped septum, leaving each side a curved reddish mark.

From debris on salt crust ; Salton, Calif.; March, 1897. (H. G. Hubbard.) I am uncertain of its position, but think it very near *Cybœodes.*

Theridium cinctipes, n. sp.

Length ♂, 1.3 mm.; femur I., 1.1 mm. long. Cephalothorax yellow-brown, margins black, blackish around eyes and extending back to the dorsal groove ; abdomen mottled with black and white, two pairs of small basal white spots, behind these a white stripe with serrate sides gradually narrowing to the spinnerets ; sides with three or four white spots ; venter black, with two prominent silvery spots ; sternum blackish ; legs white, with black bands at ends of joints and on the middle of tibia I. Abdomen moderately high, one and a half times as long as broad ; leg I. very long, femur I. more than twice as long as femur III., tibia I. much longer than the cephalothorax. The male palpal organ is short and compact. There is a transverse mark across its base which has an upward projection near its outer end ; a circular dark bulb is nearer the tip on the outer side, and from it a slender dark tube extends below, across and upward toward the tip, where it ends in a short, pointed sheath ; near base of the sheath there arises a larger, curved, pointed process.

Brazos Co., Texas.

Theridium subterraneum, n. sp.

Length ♀, 3 mm.; tibia I., 1.8 mm. Pale yellowish, legs rather darker, a dark trifurcate mark on the cephalothorax ; abdomen gray, with some blackish transverse patches in two rows on the dorsum. Cephalothorax highest behind eye-region ; P. M. E. slightly farther from each other than from the P. S. E. ; A. M. E. smaller and less than their diameter apart ; legs quite long, femur I. longer than the cephalothorax, abdomen sub-globose, longer than broad, and as high as broad, clothed (as elsewhere) with long hairs. Epigynum shows a triangular area, with

a slender point in front, behind is a transverse area pointed in front, and in front are two dark spots connected to the posterior area by a reddish line. Taken from graves, Washington, D. C. (Dr. Motter.)

Nesticus cavicola, n. sp.

Length ♂, 1.5 mm. Wholly pale whitish, clothed with long bristly hairs. Cephalothorax rather short and broad; six eyes, sub-equal in size, A. M. E. not visible; posterior row nearly straight, the P. M. E. farther apart than from the P. S. E.; S. E. touching; sternum broad, sides rounded; legs long, all femora longer than the cephalothorax, hairs on legs longer than the diameter of the joints; abdomen pointed behind, one and a half times longer than broad. Femur of male palpus rather long, palpal organ large, a projection of tibia broadest near tip and bifid, one branch is cleft; the style is long, curved around tip of bulb, from the tip of bulb there projects outward a pointed spine, and below is another projection tipped with a short black hook. From a cave, Chiricahua Mts. (Wood Canon), Ariz., June, 1897. (H. E. Hubbard.)

Erigone albescens, n. sp.

Length ♀, 1.8 mm. Cephalothorax, legs, mandibles, and sternum uniform yellowish, abdomen uniform whitish gray; eyes on black spots. Head rather elevated; posterior eye-row procurved, the P. M. E. about as far from each other as from the equal P. S. E.; A. M. E. small, and close together. Mandibles of moderate size, vertical, armed along their lower front margin with several teeth, and behind with a row of denticles, sternum broad, sides rounded, blunt pointed behind; legs of moderate length, with many hairs and a few spines, one above on tibia IV.; abdomen oviform, clothed with scattered stiff hairs, which arise from minute yellowish dots; epigynum shows two curved dark lines approaching each other from behind, and a darkish spot outwards from their tips. From the inside of coffins in graves opened during the transfer of a cemetery, Washington, D. C. (Dr. Motter.)

Philodromus pacificus, n. sp.

Length ♀, 4.1 mm. Cephalothorax yellowish, darkest on the sides, which are densely mottled and lineate with red-brown, a white ∨ mark on the middle with its apex near the dorsal groove, dorsum of abdomen white, showing two basal pairs of yellowish muscular spots, sides of abdomen broadly suffused with red-brown from base to tip, venter whitish; femora, patellæ, and tibiæ pale reddish brown above, lighter below, distal joints yellowish. Sternum light yellowish, the body is full,

quite broad and short. Eyes not widely separated, P. M. E. as close to P. S. E. as to A. S. E., the A. M. E. are not very much nearer the A. S. E. than to each other. Abdomen twice as long as the cephalothorax. Femur II. longer than the cephalothorax. The epigynum shows an area longer than broad, with nearly parallell sides, divided by a rather narrow septum widened at its tip, the apical part of the sides are dark circular, and the basal part light and oval. Olympia, Washington. (T. Kincaid.)

NOTES ON COLLECTING AT BLOOM.

BY A. W. HANHAM, WINNIPEG, MAN.

At Brandon, Manitoba, in 1896, some very successful collecting was done on the prairies and open hillsides surrounding the town. Except in the valley of the Assiniboine River, which is still well wooded, the country around Brandon is very open—regular prairie country—with, of course, a good proportion under cultivation, it being one of the good wheat-growing districts of Manitoba.

However, there is plenty of good collecting ground to be found in almost any direction, and within a few minutes' walk. A short account of collecting at bloom may be of interest to our entomological readers, especially to those who have never visited "the boundless prairies of the West." Or there may be some who have had that pleasure, but have never tried collecting in this way, for lack of opportunity.

In 1896, I was at Brandon from July 9th to August 4th, and in 1897, from August 5th to 28th.

In 1896, I had my first evening collecting on the 15th; in previous years I had often collected off flowers towards dusk, and that was my procedure on this evening. It was on my homeward way that the inspiration came to me to sweep the clumps of bloom I came to, and the result astonished me, and led to the practice of collecting in this way on all available evenings.

It was quite too dark to see things moving on the wing or at rest on the flowers, and the only way to find out the contents of the net, after sweeping, was to hold it up against the sky line; even then it was generally impossible to tell what the catch consisted of, though the moths in the net could be seen and counted. After sweeping a few heads of bloom, it was nothing out of the way to find a dozen or more moths in the net, and it was surprising how little struggling they did either in the

net or when bottled. Most of the Noctuids contented themselves with crawling about the net, and quite a number feigned death; the presence of a Plusia in the net could almost always be told by the noise it made in flying.

First bottling the lively ones as they flew up the side of the net, I would then shake or gather the rest into a corner, and then, putting my wide-mouthed bottle in, I would run it up the slope of the bottom side of the net and everything would tumble or be scooped into it. Of course, during the whole process the net had to be held up against the sky, and I managed to keep it at the right elevation and steadiness by gripping the end of the stick between my knees. This allowed me the free use of both hands for securing the catch.

Even on quite cool evenings—when before dark hardly a thing had been noticed on the wing—quite a number would still be swept off the flowers, and they were even more sluggish than usual.

As in "sugaring," the number of species taken, outside of the Noctuidæ, did not amount to anything.

As the catch of the evening was, to a great extent, an unknown quantity—as to the species taken, not the numbers—the anticipation of the "output" on arrival home was decidedly pleasurable, and, till the novelty wore off, rather exciting.

Plusias were not taken in any great abundance by this method; in fact, the majority of those captured during my visit were netted before dark.

The plants or flowers off which the moths were swept were as follows:

Wild bergamot or horsemint (*Monarda fistulosa*, var. *mollis*).

Scotch thistle (*Cnicus undulatus*).

Spreading dogbane (*Apocynum androsæmifolium*).

Wild sunflower (*Helianthus rigidus*).

Species of golden-rod, of which *Solidago rigidus* appeared the most attractive.

Of the above, the wild bergamot, while it lasted, was, without doubt, the most alluring. It seems to grow pretty generally over the prairie, both in the open and in open bush, especially among clumps of silver-bush.

Unfortunately, during my second visit very little of it remained in bloom, but the wild sunflower was everywhere in profusion.

On July 15th I took my first specimen of *Plusia insolita*, and on

the 25th, the second ; on July 23rd a *Plusia biloba* (such a beauty), and on the 24th I secured *Deva purpurigera.*

In July, the most abundant Noctuids were: *Noctua fennica, Carneades flavicollis* (a good species) and *tessellata, Hadena devastatrix*, and *Leucania commoides;* and of these *flavicollis* was easily the most plentiful, and every evening, after the examination of the contents of the bottles, it was thrown out by the score.

A few of the best captures in July were: Several species of *Rhyncagrotis; Noctua patefacta, normaniana* and *atricincta; Carneades pleuritica, basalis, silens* and *redimicula; Mamestra purpurissata; Orthosia Conradi?* and *Cucullia florea.* In August, *Noctua collaris, Hadena stipata* and *transfrons, Oncocnemis atrifasciata, Caradrina extimia*, etc. ; and the following predominated then : *Noctua baja, Feltia subgothica and jaculifera*, and *Carneades insulsa* ; and a large, handsome pyralid, *Eurycreon sticticalis*, was very common at flowers at night, as well as during the day.

Both *Noctua collaris* and *Hadena transfrons* seemed to have a decided preference for *Solidago rigidus.*

At Winnipeg there is but little open prairie near the city, or easy of access, consequently few attempts have been made at this style of collecting. Mosquitoes, too, are much more in evidence here, and evening collecting, for this reason, until well on in August, has to be abandoned.

The Canada thistle (*Cnicus arvensis*) is a regular pest in and around Winnipeg; when in bloom it is very attractive. I have taken *Plusia ni* and *Californica* off it (July 30th), and *thyatiroides* (Aug. 15th), in 1895, and in 1896 (Aug. 10th), *Orthosia euroa* was very common; by sweeping after dark I secured this species in abundance, and only kept a portion of those netted.

On August 11th (1896), I got five specimens of *Noctua collaris*, all off *Solidago rigidus.*

On August 18th and 24th (1896), I captured the same number of *Plusia thyatiroides* off a tall wild sunflower (*Helianthus scabra*) growing in dark woods near Elm Park. I was "sugaring" on these evenings, and some of my sugared trees were within a few feet of the flowers, but these Plusias apparently were not attracted to the sugar in the least.

I have never yet captured a Plusia "at sugar," but others, who have done more "sugaring" than I have, may have taken them in this way.

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, N. Y.

(Continued from page 164.)

DIASTICTIS BENIGNA, n. sp.

Expands 23 mm. Palpi rather long, heavy, drooping, blue-gray; front, thorax and abdomen blue-gray, the latter whitish lined posteriorly on segments. Fore wings bluish-gray, lightest on middle field, mixed with some black scales; basal line faint or obsolete, marked by a black spot on costa; middle line beginning with black spot at costa, then through black lengthened discal spot, then obsolete; outer line with black spot at costa, otherwise obsolete; outer field darker towards margin, with a large brown submarginal shading between 3 and 5. Hind wings even, smooth, blue-gray. Beneath dark bluish fuscous on all wings, becoming blackish along outer margins; costa of fore wings speckled with black and gray.

Los Angeles Co., Cal. Type in National Museum. An insect very much in appearance like the Eastern *Macaria minorata*, Pack., but the fore wings are not falcate, the hind wings are not angled, and the palpi are much longer and heavier. The antennæ of *D. benigna*, here described, are wanting, so the generic reference cannot be certain; but as there is no hair pencil on hind tibiæ in ♂, it cannot be either *Sciagraphia* or *Macaria*, as I define them. Type No. 3959.

DIASTICTIS SERICEATA, n. sp.

Expands 24–26 mm. Palpi, front and thorax, white; abdomen white, with fuscous stain, with many intermixed black scales. Fore wings white, with long light fuscous cross striations, which become many exceedingly fine, yet sharply distinct, though often broken, cross lines, giving an appearance of solid colour to the naked eye; a black, geminate, straight, basal cross line; another outward, less distinct, also geminate, nearly straight, with a band of reddish-brown between; discal spots black. Hind wings light fuscous, becoming grayish outwardly; marginal line of black spots on all wings. Beneath fuscous gray, coarsely striated with fuscous on hind wings, outer margins darkest. The fore wings have a smooth, silky appearance, with an apparent broad central band, even in width across the wing.

Colorado Desert, from Hy. Edwards; Arizona, from Dr. Kunzé. The latter taken from Aug. 29 to Sept. 9, 1896.

JUBARELLA, n. gen.

Palpi light, small; front quadrate, somewhat bulging; antennæ of ♂ simple, flattened, very finely ciliate; thorax light, tufted in front, patagiæ long scaled; abdomen slender, untufted; wings broad, extended, even, rounded; fore wings without fovea below in ♂, 12 veins, 10 and 11 from cell, anastomosing with 12 and each other; hind wings, 8 veins, 5 undeveloped. Legs rather long, fore tibiæ unarmed, hind tibiæ with two pairs of spurs, not swollen, without hair pencil. ♀ unknown, possibly wingless.

JUBARELLA DANBYI, n. sp.

Expands 48 mm. Palpi and front black; thorax black, tuftings whitish at ends; abdomen blackish-gray, interlined; wings even, blue-gray, with scattered black scales, these less and so the gray lighter in a broad sinuous band beyond discal spot; a brownish shading towards apex and submarginally to inner margin; discal spot white, with edging cloud on fore wings, black and prominent on hind wings; the hind wings less blackened, and so generally lighter than fore wings; fore wings with black dashes on veins 3, 4, 5 and 6 on outer space, hind wings with row of faint black dots outwardly on veins. Beneath gray-black striated; fore wings with black outer line, brownish near apex; hind wings with outer row of black spots.

Rossland, Brit. Col.; from Mr. Danby. A rather lightly scaled insect resembling *Coniodes plumigeraria*, Hulst.

SPODOPTERA KUNZEI, n. sp.

Expands 25–28 mm. Palpi and front whitish ochreous; antennæ fuscous; all wings whitish, evenly overlaid with light fuscous striations, without lines; discal spots prominent, white by absence of striations; thorax and abdomen white or with a fuscous tint; beneath a glistening white, with a fuscous tint, with an ochreous shade along costa and margins. The abdominal tuftings which mark the genus are prominent, ochreous, shading to blackish.

Prescott and Senator, Ariz.; from Dr. Kunzé, in whose honour the specific name is given.

ÆTHYCTERA LINEATA, n. sp.

Expands 35 mm. Front thorax and abdomen gray; fore wings whitish, with scattered black atoms, these heavier on costa and subdiscal vein, making these distinctly apparent; the scales darken by

quantity into blackish lines between veins 1 and 2, 3 and 4, and 4 and 5, the last reaching half the wing to outer margin; the second the heaviest and black, but shortest; the first nearly the whole length of the wing, and lightest. Hind wings white, silky; all wings thinly scaled, rather long and narrow. Beneath more smoky, the fore wings with the markings above fainter.

Glenmore Springs, Colorado; from Dr. Barnes.

ALCIS MAESTOSA, n. sp.

Expands 33 mm. Palpi black below, ochre above; front fuscous gray; antennæ dark fuscous; thorax fuscous gray, mixed with blackish; abdomen fuscous, blackish dorsally, and posteriorly on segments; wings broad, even fuscous, mixed more or less with black, with many of the scales loosely raised, and in the light showing as powdered white atoms; fore wings, basal line fine, black, rounded, somewhat angled at cell; outer line rather evenly wavy, fine, black, nearly parallel with outer margin; an outer line of intervenular blackish shadow spots, and a corresponding marginal line connecting with black marginal points, the veins on outer field being rather broadly smooth, fuscous in colour. Hind wings corresponding with fore wings, the black being heavier and less separate at veins, the basal line obsolete, the outer line wavy, dentate, rounded; the outer blackish spots edged outwardly with a dentate white line; marginal line of broken black spots; all discal spots present, black. Beneath fuscous blackish, the outer lines showing in black points on veins, the outer margin darker fuscous; discal spots present.

Label doubtful, either Ia. or Ga., probably the former; taken Apl. 22. Type in National Museum. Type No. 3942.

ALCIS LALLATA, n. sp.

Expands 45–48 mm. Palpi and front blackish; thorax bluish-gray, with black collar and edge to patagiæ; abdomen fuscous, with black scales mixed; fore wings a bright blue-gray, with black shadings and cross lines; basal lines well out, fine, geminate, bent, waved; a middle blackish shading with strong outer sinus just below black discal spot; outer line bent outwardly beyond cell, rather evenly scalloped its whole length; an outer line of faint whitish lunules; veins black at ends; hind wings gray fuscous, even, without lines, discal spots faint. Beneath smooth, light fuscous, slightly darker towards margins.

Senator, Aug. 20; Prescott, July 9; and San Francisco Mts., Ariz., July 26; from Dr. Kunze.

SELIDOSEMA LACHRYMOSA, n. sp.

Expands 30 mm. Palpi black, tipped with ochreous; front black; thorax blackish fuscous; abdomen blackish fuscous. All wings nearly uniform blackish fuscous, fore wings rather narrow, apex acute, outer margin rounded, inner margin long; inner line well out, rounded, a sinus at cell opposite discal spot, and a less one at vein 2; outer line beginning on costa near apex, strongly sinuous, the largest sinus outwardly at vein 3, and a short, almost angular one close to inner margin, whose middle the line reaches, or a little beyond it; the lines are fine, black, the outer faintly edged outwardly with gray; a faint whitish, subwavy, submarginal line nearly parallel with outer margin; discal spot rather large, oval, white. Hind wings triangular, both angles prominent and sharp, outer margin irregularly wavy; a faint discal shadow line; an outer fine, black, somewhat undulating line; discal spot distinct, white; marginal lines on all wings fine, black, broken. Beneath almost even blackish fuscous, smoother than above.

Los Angeles Co., Cal.; taken in July.

CLEORA SUBAUSTRALIS, n. sp.

Expands 42 mm. Palpi moderate, ascending, fuscous brown, black in front and at end; front dark smoky fuscous; summit fuscous brown; thorax dark fuscous, with a bluish tinge, behind lighter; abdomen ochre fuscous, stained and dotted dorsally with blackish, incompletely interlining the segments. Wings light brownish ochre, heavily and quite evenly overlaid with blackish patches and striations, giving a generally mottled appearance, enough separated basally and outwardly to give faint indications of rounded sinuate lines of ground colour; a lighter spot outwardly at vein 3; a large, lengthened, black discal spot, and a marginal line of rather heavy intervenular black points. Hind wings corresponding to fore wings, a lighter spot at vein 3, a faint zigzag lighter outer line, a lengthened black discal spot, and a line of black intervenular lunules. Beneath even light ochre brown; fore wings darkened basally along costa, and outwardly below apex; discal spots on all wings, long, black; some faint blackish striæ scattered on fore wings.

Cocoanut Grove, Florida. National Museum collection. The generic reference is provisional. Type No. 3960.

CLEORA PEDICELLATA, n. sp.

Expands 43 mm. Palpi rather long, porrect, rather slender, ochre, heavily marked with black, last segment black; front tufted, ochre

fuscous below, black at middle, and stained with reddish above; antennæ dentate, with two slender spines, quite long, from each segment, ochre brown, ringed with black; thorax ochre brown, mixed with blackish; abdomen ochre brown, the segments lined with black. Fore wings ochre brown, somewhat marked with black; basal line indeterminate, two outer lines quite oblique, wavy jagged, definite only on posterior half of wing, and anteriorly shown by venular spots; an outer submarginal line of black intervenular spots, this followed by a second quite indeterminate; black, large, rounded discal spot, and a marginal row of intervenular black spots; hind wings colour of fore wings, with seven blackish cross lines, the fifth from base being finer, more distinct, and more irregular than the others, which are quite even and subparallel; discal spot black, rather large, with a whitish lunule within; marginal line black, of scarcely confluent marks, each with an inner white edging. Beneath very much as above, but with a strong reddish tinge, the lines less distinct, and with an outer row of black spots on both wings. The wings above have scattered, pedicellate, upright scales, black at ends, and generally white on lower half; these form a distinct tuft at the discal spots on all wings above.

Cocoanut Grove, Florida. National Museum collection. I have the female only. The insect probably represents a very distinct new genus. Type No. 3958.

SELIDOSEMA CONFIGURATA, n. sp.

Expands 40 mm. Palpi and front blackish; thorax gray; abdomen ochre-gray, with dark fuscous interlining and dorsally; fore wings gray, with a bluish tint, with some washing of fuscous and scattered black scales; lines black, distinct; basal rounded, with a black dot within it at cell; middle line passing through large black discal spot, sinuous to inner margin; outer line very distinct, bent out sharply at cell, then rounded back subparallel with outer margin, coalescing between 1 and 2 with middle line, then separating to margin, outwardly last half with heavy shadowing; a subapical black dash; lines outwardly a little brownish; margin a little wavy, line black, heavier at ends of veins; hind wings, gray; a straight basal line, a distinct black extradiscal rounded line, and a submarginal shadow; margin somewhat wavy, black lined; beneath light fuscous, even in colour, the lines finely, but distinctly, produced.

Colorado; from Dr. Gillette.

[TO BE CONTINUED.]

BOOK NOTICE.

Twenty-first Report of Observations on Injurious Insects and Common Farm Pests During the Year 1897, with Methods of Prevention and Remedy. — By Eleanor A. Ormerod, London: Simpkin, Marshall, Hamilton, Kent & Co., 1898 (1s. 6d.), pp. 160.

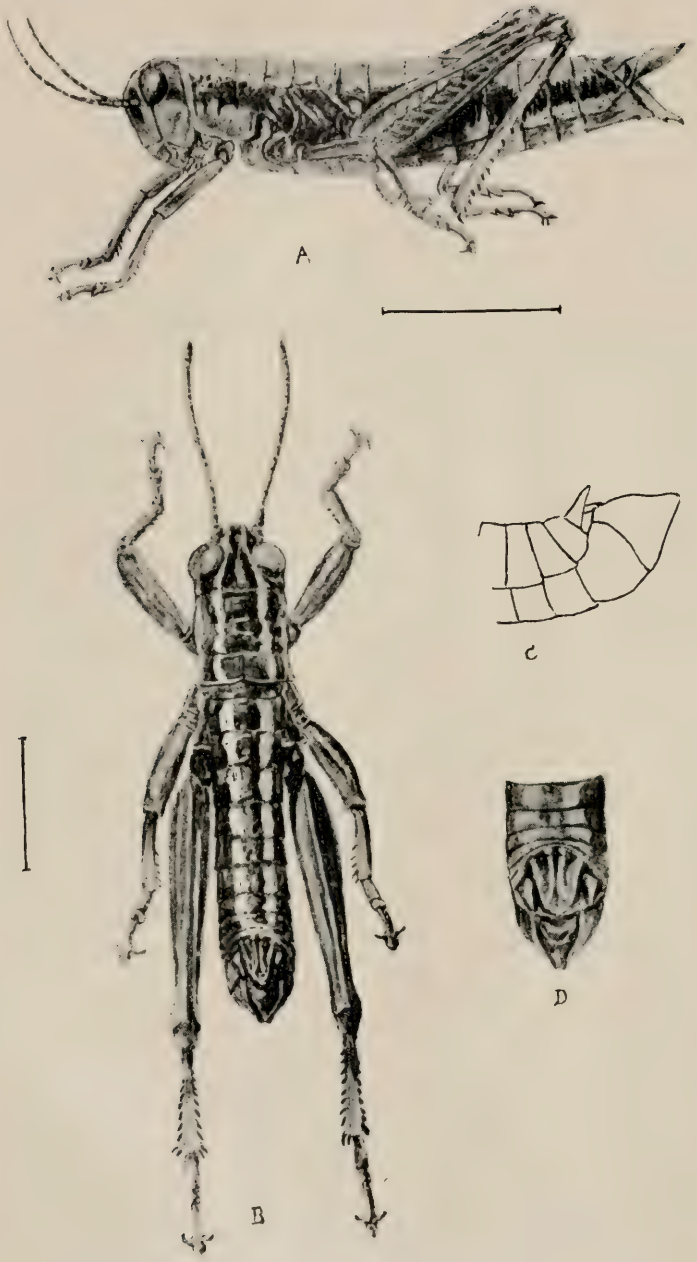
We beg to offer our hearty congratulations to Miss Ormerod on the publication of the twenty-first of her annual reports. Twenty-one years is a long period for anyone to carry on a laborious work, but this talented and indefatigable lady has not only accomplished a most valuable and important work, she has done so without any assistance except that of her late lamented sister, and entirely at her own expense. On this side of the Atlantic reports of this character are published by the Government of the Province or State to which they belong, but in England no official recognition has been shown, and though the country has undoubtedly been saved hundreds of thousands of pounds by the instructions given in these Reports to the farmers and gardeners of Great Britain, whereby they have been able to intelligently cope with their insect foes, and employ the best methods of prevention of their attacks, yet no aid has been afforded her from the public purse. No recognition of the immense value of her work has been vouchsafed by the powers that be. But while officially ignored, Miss Ormerod's name and work are held in the highest honour throughout Great Britain, and treated by the press in every department with the utmost respect; and in many British colonies and several foreign countries her name is widely known and her talents fully recognized.

A single observer, however able and industrious, could not possibly pay attention to all the manifestations of insect injury throughout the British Isles, but Miss Ormerod has by degrees gathered together a corps of observers in every county and district throughout the United Kingdom, and is kept closely informed of all that causes injury or loss to crops or fruit, and to live stock as well. During the past year she received about 3,000 letters on entomological subjects, and with the aid of a secretary was enabled to attend to them all. She thus conducts at her own charges what ought to be a Division of Entomology in the Department of Agriculture at London.

In the report before us, thirty-six species of insects are dealt with and figured, their ravages described, and methods of prevention and remedy fully given. Several of them are familiar to us on this side of the Atlantic; *e. g.*, Apple Codling Moth, Cockroaches, *Xyleborus xylographus*, Mediterranean Flour Moth (*Ephestia kuhniella*), etc.

From the care and accuracy which characterize her descriptions and figures, Miss Ormerod's work is of permanent value to economic entomologists everywhere, and her reports are always received with welcome and gratitude by those who have the good fortune to obtain them. That she may long be spared to carry on her admirable work is the earnest aspiration of her many friends. C. J. S. B.

Mailed July 6th, 1898.



ASEMOPLUS NUDUS, NOV. SP.

The Canadian Entomologist.

VOL. XXX. LONDON, AUGUST, 1898. No. 8.

A NEW ALPINE GRASSHOPPER FROM WESTERN CANADA.

BY E. M. WALKER, TORONTO.

Among a large number of Orthoptera taken by myself during a trip to the Pacific Coast by the Canadian Pacific Railway there is one species belonging to the Melanopli which I was unable to determine from Scudder's "Revision" of the group, and could not even satisfy myself as to its generic place. I therefore sent a pair to Mr. Scudder, who informed me that it was a new species of *Asemoplus*, but that a change would be necessary in the description of that genus as given in his "Revision of the Melanopli" in order to receive my species. I had noticed the resemblance to *Asemoplus* in the extremity of the male abdomen, but the total absence of tegmina and other points of dissimilarity caused my uncertainty regarding its true generic position.

I have accordingly prepared the following description taken from 3 ♂'s and 5 ♀'s, of which 2 ♂'s and 1 ♀ were taken near Sandon, B. C., in the Gold Range, and the others on Mt. Piron, near Laggan, Alberta.

Asemoplus nudus, n. sp.

Rather stout and strongly built; tegmina and wings entirely absent; dull olivaceous above in the ♀, black with two longitudinal dorsal yellow stripes in the ♂.

Frontal costa not prominent, fading before the clypeus, equal, sulcate at and below the ocellus, or sometimes throughout in the male, a little wider than the first antennal joint in the ♂, about half as wide again in the ♀. Vertex a little tumid, scarcely raised above the pronotum; fastigium rather steeply declivent, very slightly arcuate, about on a level with the eyes or sometimes a little below in the ♂, feebly depressed, considerably expanded anteriorly.

Interspace between the eyes half as broad again in the ♂, twice as broad in the ♀ as the first antennal joint. Eyes rather small, a little prominent in the ♂, but little longer than broad, subtruncate anteriorly, about as long as the infra-ocular portion of the genæ. Antennæ shorter than the hind femora, in the ♀ about as long as the head and pronotum,

in the ♂ nearly half as long again. Pronotum rather short, the sides nearly parallel in the ♂, but considerably divergent in the ♀, so that the posterior border is more than one-third as long again as the anterior. Disk broadly convex, passing into the nearly vertical lateral lobes without a trace of lateral carinæ. Prozona a little more than twice as long as the metazona, quadrate or slightly tranverse in the ♀. Anterior and posterior margins of the disk truncate, the latter slightly emarginate. Median carina slight, nearly obliterated on the prozona, but distinct on the metazona. Posterior margins of lateral lobes but little oblique, forming a decided angle with the lower margin. Prosternal spine nearly vertical, short, conical, not very blunt. Interspace between the mesosternal lobes in the ♂ nearly half as broad again as long and nearly or quite as broad as the lobes themselves, in the ♀ twice as broad as long and distinctly broader than the lobes. Metasternal lobes rather distant in the ♂, more distant than the width of the frontal costa in the ♀. Legs rather stout; fore and middle femora tumid in the ♂. Abdomen with a distinct median carina. Extremity in the ♂ feebly clavate and a little upturned. Supra-anal plate three-fourths as broad at the base as long, triangular with an obtusangulate apex; sides gently emarginate, considerably elevated, median sulcus nearly percurrent, moderately deep, its bounding walls about as much elevated as the sides. Furcula consisting of a pair of minute rounded tubercles. In one specimen, which is the one figured, it is quite distinct and much better developed than in the others, in which it is almost obsolete. Cerci distinctly shorter than the supra-anal plate, about twice as long as the width at the base, compressed, styliform, tapering a little more rapidly in the basal than in the apical half. Subgenital plate rather large, conical, apical margins not elevated above the lateral margins, the latter parallel on their basal half, but narrowing beyond to the small mesially notched apex. Upper valves of ovipositor rather short, not narrowed at base, slightly falciform apically. In the specimen shown on the plate they are more than normally exserted.

Colour of Dried Specimens.—Female: Dull, rather dark olivaceous above, dull yellow tinged with olivaceous beneath. Face and lower half of the lateral lobes of the pronotum yellowish-green or olivaceous, more or less clouded with grayish olivaceous, especially on the clypeus and labrum; a broad piceous band starts from the middle of the posterior border of the eye, passes over the upper half of the pateral

lobes of the pronotum, then broadens until it reaches the abdomen, thence gradually narrowing until it disappears at about the last segment. Behind the pronotum it changes from shining piceous to rather dull black. Antennæ olivaceo-fuscous, paler at the base. Fore and middle legs olivaceo-fuscous, yellowish beneath. Hind femora reddish-brown internally, dull orange beneath, dull fuscous externally, with little or no indication of fasciæ above. Hind tibiæ luteous, more or less clouded with olivaceous, and all the colours are darker and duller than in the other specimens.

The male differs in coloration as follows: It is black above, with the exception of a moderately broad, bright yellow stripe running from the upper posterior corner of each eye, along the dorsum of the pronotum just above the lateral lobes and along the abdomen to the last dorsal segment. On the abdomen they are separated by a space of about the width of one of the bands, and are narrowly interrupted at the base of each segment. The black lateral band is much better defined than in the ♀, and on the abdomen is sharply separated from the bright yellow venter. The markings are in general more distinct and the colours brighter than in the female.

Length of body: ♂, 16 mm.–18.5 mm.; ♀, 22.5 mm.–23.5 mm.

Length of antennæ: ♂, 7 mm.–8 mm.; ♀, 5 mm.–8 mm.

Length of head and pronotum: ♂, 5 mm.–5.8 mm.; ♀, 6 mm.–7.5 mm.

Length of hind femora: ♂, 8.5 mm.–10 mm.; ♀, 10.5 mm.–11.3 mm.

The three specimens from Sandon were taken on the grassy path of a snowslide, at an elevation of about 2,600 feet, on September 16, 1897; while those from Mt. Piron were captured on September 19, 1897, at about 7,000 feet, being above timber-line.

In the accompanying plate (A) is a lateral view of the ♀, (B) a dorsal view of the ♂, (C) and (D) are respectively lateral and dorsal views of the male abdominal appendages.

A NEW CYCHRINID.

BY THE REV. J. H. KEEN, MASSETT, QUEEN CHARLOTTE ISLANDS, B. C.

This fine plum-coloured beetle—superficially resembling *Cychrus marginatus* — was taken by me in 1896, and kindly named for me by Captain Casey, whose description of it, published in his Coleopterological Notices, No. VII, page 334, I take the liberty of transcribing

below for the benefit of Canadian students who may not see Captain Casey's books. The beetle occurs sparingly, under loose bark or under logs on the ground, along the mainland of British Columbia from Fort Simpson to Rivers Inlet, and probably farther, if sought for. I have never met with a specimen on the Queen Charlotte Islands.

The following is Capt. Casey's description :

"*Brennus insularis*, n. sp.—Elongate, rather feebly ventricose, shining throughout, black throughout the body and legs, the elytra rather dusky cupreo-violaceous, with narrow and bright aeneous side margins. *Head* rather stout, moderately elongate, the vertex almost smooth, the broadly impressed transverse nuchal constriction rather pronounced ; genæ feebly developed, with the angular notch small and inconspicuous ; supra-orbital ridges moderately strong and inwardly inclined at the antennæ, fine posteriorly ; antennæ slender, moderate in length, the basal joint distinctly thicker, claviform, not as long as the next two, the seta at apical eighth. *Prothorax* well developed, scarcely as long as wide, moderately dilated and broadly rounded throughout anteriorly, the sides not more strongly rounded before, but becoming gradually oblique behind ; the middle, to the base, with a scarcely visible ante-basal sinuation ; angles much more than right, and bluntly rounded ; base wide, more than half the maximum width and fully as wide as the head ; disk feebly convex, the median line strong ; sublateral impressions deep, extending far before the middle ; reflexed margins rather fine. *Elytra* elongate-elliptical, fully half longer than wide, nearly three and a half times as long as the prothorax and two and a third times as wide ; humeri evenly and obliquely rounded ; reflexed margins ample but rather finely punctate ; disk strongly, evenly convex, the striæ deep and broadly impressed, rather uneven, obscurely punctate, readily traceable throughout the width, the intervals convex, much broken up toward the sides and finely so toward the apex. Legs very slender. Length 17.5 mm.; width 6.8 mm.

"Queen Charlotte Islands. [This is an error. See above.—J. H. K.]

"This fine species is founded upon a single perfect specimen recently sent to me by Mr. Fletcher and probably taken by Mr. Keen. It is a female, but the species will be readily known from *marginatus* by its much larger size, more elongate and convex elytra, larger and less posteriorly narrowed prothorax, with the sides less sinuate toward base, and several other characters."

NOTE ON THE DIURNALS.

BY A. RADCLIFFE GROTE, A. M., ROEMER MUSEUM, HILDESHEIM.

Mancipium brassicæ.—Dr. Chapman writes me that certain specimens of this common species examined by him showed the very short veinlet III. 3 + 4. This veinlet constantly diminishes in size, progressing towards the tip of the wing to finally vanish, through many forms of the *Pieridæ*. I had indeed expected it to be occasionally persistent in *brassicæ*, although my preparations did not show it. It has disappeared in *Pontia daplidice*, in *Nathalis iole*, and, strange to say, in that curious and now isolated Pierid, *Gonophlebia paradoxa*. This variability, in one and the same species, is interesting because it follows the general evolutionary direction of the changes in the venation. Always the radial branches in the Pierids and other groups tend to diminish in number. Always the disintegration of the Media advances, until it finally disappears, as a system, from the surface of the wing (*Rothschildia*, *Samia*, *Potamis*, etc.). A parallel case to that of *brassicæ* is offered by *Copismerinthus ocellata*. In some specimens of this Hawk Moth, vein IV_1 is still thrown off from the cross vein of the hind wings, instead of the Radius, which it has usually ascended to beyond the cell. We must regard these as instances of generalization in the individual, of a reversion to what was formerly the rule and is now becoming, by slow degrees, the exception. Mr. Scudder kindly informed me that he believed that slight structural differences in all stages of *brassicæ* could be demonstrated as compared with the type of *Pieris*. In my studies I am mainly concerned with the correct use of generic names extant in literature, without attempting to judge of the comparative value of such differences; if any characters can be found I take them as generic if a title exists in literature. We may reasonably regard *Mancipium* as a development of *Pieris* since it shows a further progress upon the same structural lines. I have tried to show that *Pontia* presents a parallel advance, but upon a distinct phylogenetic terminal line, belonging to the *Anthocharini* and not to *Pieris* as heretofore classified. The five-branched Radius of *Euchloe stella* has been reduced to four in *Tetracharis cethura*, to three in *Pontia daplidice*, which retains the Anthocharid pattern and shape of wing.

Eumargareta coresia.—I have recently studied this South American Nymphalid, which belongs taxonomically to the *Nymphalinæ*, but differs by position of the last radial branches, and can hardly be a member of the phylogenetic group to which *Limenitis* and *Nymphalis lucilla*

belong, and which embraces also *Basilarchia*. Mr. W. F. Kirby writes me that he cannot find that any new name has been proposed for *Megalura*, Blanchard, 1840, preoccupied by Horsfield, 1820, and Agassiz, 1833. (See Scudder, Historical Sketch, 212.) I have accordingly proposed the above generic title for the type *coresia*. What is relatively unimportant at the present time seems to be a discussion of rules limiting the application of the law of priority, all of which are arbitrary in their nature and cannot compel universal consent. What appears to me of greater practical value is the fixing of the types of existing generic titles, so that the use of these by themselves, without mention of any species, may be intelligible. The discord is already such that much of what has been recently written by the systematists on the Diurnals cannot be followed or clearly understood.

Issoria lathonia.—This is a distinct genus from *Argynnis aglaiæ*, in which type vein III_2 is appressed upon the Radius to a point beyond the cell, while really arising at a point within the cell. In *Issoria* this appression, which prepares us for the point of emission of vein III_2 in *Melitæa*, has not taken place. In *Issoria*, vein III_2 is brought nearer than in *Brenthis hecate*. These two types, *Issoria* and *Brenthis*, appear more generalized than *Argynnis*. Both in *Dryas paphia* and in *Acidalia niphe* the appression has taken place as in *Argynnis*, and I am at a loss to distinguish the genera from the neuration. In the more specialized *Agraulis* all the branches arise beyond the cell. With the lengthening of the wing the radial veins tend to arise beyond the cell and reproduce the character found in *Leptidia* and other "long-wings." In *Dione iuno*, vein III_1 has not progressed so far beyond the cell as in *Agraulis vanillæ*. In *Euptoieta claudia*, vein III_1 has not reached the extremity of the cell; the cross vein is nearly vanished on hind wings between IV_2 and cubitus, a specialization in the direction of *Melitæa*. In *Euphydryas phaeton* the only deviation from the *Melitæa* type is the very slightly more strongly retained cross vein on primaries. This is hardly noticeable, and I am at a loss to distinguish the genus by the neuration from *Melitæa maturna*. I can also not distinguish *Cinclidia*. The genera *Acidalia*, *Dryas*, *Euphydryas* and *Cinclidia* do not afford neurational characters by which they may be distinguished, the two first from *Argynnis*, the two latter from *Melitæa*. In *Phyciodes tharos*, vein III_1 springs from Radius before extremity of cell; vein III_2 as in *Melitæa;* vein III_4 decidedly to apex of wing, as frequently

occurs in the group of *Argynnini*. It has the *Melitæa* specialized character of the open cell on secondaries, but in the type of *Melitæa* vein III_4 does not attain apex of wing, but falls below it. The *Melitæini* are more specialized as a group than the *Argynnini*. This latter seems on the whole the generalized group of the *Nymphalidæ* proper, and from the ancestors which the modern Fritillaries represent may have sprung the holarctic *Argynninæ*, and from these the *Nymphalinæ*. But the latter are, perhaps, not monophyletic; at least the West South American *Eumargareta* excites doubts which do not arise from a study of the South American genus *Adelpha*, which latter, no doubt, belongs phylogenetically with the Old World *Athyma*, although the pattern differs. The definition of the Nymphalinæ by the taxonomic character of the coalescence of veins II. and III. of the hind wings up to the point of the almost stationary I. (the "præcostal spur" of some writers) probably throws together butterflies which have reached this specialization by different routes.

Morphinæ.—My study of *Morpho* leads me to believe that the group has sprung from the Satyrid stem. It has attained the grade of specialization of *Melitæa*, the cell on hind wings open. It would seem that these butterflies are specialized *Agapetidæ*, which have assumed the habit of a more lofty flight. As a rule, the "tree" butterflies and moths seem more specialized, and have probably everywhere appeared later upon the scene.

CONCERNING XANTHORHOE GLACIALIS, Hulst.

Dr. Hulst describes the species and *X. longula* in May Can. Ent., p. 119. The National Museum has a long series of these (225 specimens), very variable, but doubtless representing only a single species. In spite of the label, I am of the opinion that Dr. Hulst's types are not American specimens. Some bear a printed label "Alaska" and "Coll. C. V. Riley"; others have a written label "Behring Island, Alaska"; and others "Behring Island." I think the whole series were collected by Dr. Stejneger at Behring Island, which is one of the Commander Islands off the coast of Kamchatka, and has in general an Asiatic fauna. It is unfortunate that these seductive little "Alaska" labels were used on the specimens. However, the species is evidently American if the type specimens are not, for we have one labelled "Aleutian Islands, Turner, 1881," and another that I take to be the same (a ♀, and rubbed), from "Nushargak River, Alaska, Aug. 14, 1881, McKay collector."

Harrison G. Dyar.

DEIDAMIA INSCRIPTA, Harr.

In the early part of May last, on meeting Mr. Bice he had the agreeable information to convey to me that he had taken a Sphinx that was new to him. Upon looking at it I at once suspected that it was new to me also; and on investigation proved the correctness of the impression. Its small size, strikingly Smerinthoid form of primaries, peculiar olive-gray colour and distinctly outlined ornamentation made it easy to determine.

Prof. Fernald gives, in his "Sphingidæ of New England," the following brief, but clear and unmistakable, description of the species:

"Expanse of wings, two inches. The head and thorax are grayish-brown, with a double, curved, white line, edged with brown across the prothorax, behind which are two other curved lines, one on the middle and the other on the hinder part of the thorax. The abdomen is ashy, and has two rows of dark brown spots. The fore wings are ashy-gray at base, in the middle and toward the apex. Three brownish bands cross the wings before the middle, another angulated band crosses beyond the end of the cell, and the outer border of the wing has two dark brown lunules on the margin below the apex, before the second of which is a third spot, with more or less white between. The discal spot is paler than the ground colour of the wing. The hind wings are of a dull reddish-brown colour, with a dusky terminal band, which grows narrow toward the anal angle. Fringes white. The mature larva is two inches long, of a fine green colour, and the body tapers from the third segment toward the head. The caudal horn is whitish at the tip. They go into the ground (not very deep), and transform into very dark brown pupæ, with the tongue-case a short elevated ridge; a short central spine at the end of the head and a spinous tubercle on each of the eye-cases. Feeds on the leaves of grape and Virginia creeper."

Mr. Grote says: "No known Smerinthoid feeds on the grape." He gives the habitat as "Canada to Virginia." To which Dr. J. B. Smith adds, "Westward to the Mississippi Valley." He also says, "The species is by no means common." It is figured in Strecker's Lep. Rho. et. Het., Plate XIII., Fig. 8.

This is the fourth Sphingid species that Mr. Bice has secured new to the Society's collection.

J. Alston Moffat, London, Ont.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 3.)

FAMILY V.—XYELIDÆ.

No species seems to be known in this family outside of the European and North American faunas, and very few species are described. The group was first treated as a subfamily by Newman as early as 1834.

The imagoes appear very early in the year, or in February, March and April, deposit their eggs and then disappear, the consequence being that very few are taken and only a few of the commoner forms are known. With more careful collecting early in the season, however, the probabilities are that many more species will be discovered in our fauna.

The imagoes of three distinct species of these insects, representing as many genera, have been bred recently from the larvæ by Dr. H. G. Dyar, and we are not only indebted to him for the first authentic life-history of a species in this group, but also for the first scientific description of the larva. His recent discovery of a large undescribed species in the rare genus *Pleuroneura* was most unexpected.

The known genera seem to fall into two well-marked natural groups, distinguished by differences in both the front and hind wings, and which are here treated as subfamilies.

Table of Subfamilies.

Front wings with the intercostal vein separated, not uniting with the subcostal; hind wings with two complete submarginal cells and one discoidal cell; ovipositor hardly half the length of the abdomen . . . . . Subfamily I., Macroxyelinæ.

Front wings with the intercostal vein uniting with the subcostal; hind wings with one complete submarginal and one discoidal cell; ovipositor as long or longer than the abdomen . . . . . Subfamily II., Xyelinæ.

Subfamily I.—MACROXYELINÆ.

The imagoes of this group are very much larger than those in the *Xyelinæ*, and are readily distinguished by the distinctly separated intercostal vein, as in the *Lydinæ*, and their much shorter ovipositor, while their larvæ seem to be strictly external feeders.

The genera now known may be separated as follows :

Table of Genera.

Antennæ 10–12 jointed.....2.

Antennæ 9-jointed, the six terminal joints very short, together not longer than the scape and less than half the length of the third joint ; clypeus with a median emargination ; claws with an erect tooth before tip.....*Macroxyela*, Kirby.

2. Clypeus anteriorly triangularly produced at the middle ; all tibiæ very spinous, the hind tibiæ with four lateral spurs beneath.

Claws cleft ; antennæ 10–11 jointed (the tenth sometimes divided into two joints), the seven or eight terminal joints very short, together not longer than the scape or less than one-fourth the length of the third joint ; only one transverse radial nervure joining the second cubital cell. *Megaxyela*, Ashm.

Claws with a large erect tooth before the middle ; antennæ 12-jointed, the nine terminal joints much shortened, together much shorter than the third joint ; both transverse radial nervures joining the second cubital cell..*Pleuroneura*, Konow.

Subfamily II.—Xyelinæ.

The species at present known in this group are very small and are readily distinguished by having the intercostal vein united with the subcostal, by having only one complete submarginal cell in the hind wings, and by the longer ovipositor. Their larvæ are apparently internal feeders.

Only two genera are known, separated as follows :

Table of Genera.

Antennæ 12-jointed, the nine terminal joints slender, lengthened, together as long or longer than the third joint ; claws long, slender, with a very minute, nearly obsolete, tooth beneath, a little beyond the middle.

Front wings with both transverse radial nervures received by the second cubital cell, rarely with the second transverse radius interstitial ; clypeus with a median ridge, which is slightly extended beyond the anterior margin, but scarcely triangularly produced.....*Manoxyela*, Ashm.

Front wings with the first transverse radial nervure received by the second cubital cell, the second transverse radius received by the third cubital cell ; clypeus anteriorly triangularly produced medially.....*Xyela*, Dalman.

Family VI., Lydidæ.

The genera in this family have been revised recently by Mr. F. W. Konow,* who treats the group as a tribe, dividing it into two subtribes, (1) *Megalodontides* and (2) *Lydides*. He recognizes eight genera, but some of these he again divides into subgenera.

Believing that these insects represent a distinct family, I have here recognized his subtribes as subfamilies, and his subgenera as genera.

In my table of families I overlooked the fact that the *Megalodontides* (exotic species) had no distinct intercostal vein, so that line 2, page 144, should be amended to read: Costal cell most frequently with an intercostal cell.

The following tables are based mainly upon those of Konow's, although I have made some changes, and used some characters not mentioned by him, which, it is believed, will render the genera much more readily distinguishable. All of them are known to me, except *Melanopus* and *Tristactus*.

Table of Subfamilies.

Head usually without the two longitudinal grooved lines on the vertex, or with only traces of them; antennæ with the middle joints depressed or concave beneath, with more or less distinct branches or processes; front wings without an intercostal vein, or it is only indicated by a streak; cubitus originating from the middle of the basal nervure; second dorsal segment of abdomen entire, without a median slit.....Subfamily I., Megalodontinæ.

Head always with two distinct longitudinally grooved lines on vertex; antennæ filiform, simple; front wings with an intercostal vein; cubitus originating from the apex† of the basal nervure or from the costal vein; second dorsal segment of abdomen emarginate or with a median slit.....Subfamily II., Lydinæ.

Subfamily I.—Megalodontinæ.

This group or subfamily, so far as I know, has no representative in our fauna. It is more particularly confined to the Asiatic fauna, a few species only being found in Europe, while but a single species has been recorded from Africa.

*Annelen des K. K. Naturh. Hofm., XII., 1897, Heft I.

†Konow says from the *base*, but in this he is in error, since the basal nervure in reality represents a fork of the median vein and originates from that vein and not from the subcostal vein, as his language would seem to imply.

It is quite probable, however, that species will yet be discovered in our fauna, especially in the unexplored regions of Alaska and British Columbia.

The four genera recognized by Konow may be distinguished by the aid of the following table:

Table of Genera.

Flagellum with joints 2–13 of an unequal length, gradually decreasing in length, the middle joints without long, compressed, subfoliaceous processes.. ..... 2.

Flagellum with joints 2–13 of an equal length, or nearly so, the middle joints with long, compressed, subfoliaceous processes or branches.

Process of the first flagellar joint at least as long as the two following joints united, or longer; penultimate antennal joint longer than the second..... *Rhipidioceros*, Konow.

Process of the first flagellar joint shorter than the two following joints united, usually shorter than the second joint; penultimate antennal joint shorter than the second..... *Megalodontes*, Latreille.

2. Antennæ at least 20-jointed; joints 4–9 in ♀, 3–13 in ♂, at apex obliquely truncate and somewhat produced, but with each process compactly united with the following; the penultimate joint of labial palpi shortened, triangular..... ..... *Melanopus*, Konow.

Antennæ 13–14-jointed; joints from fourth and beyond triangular, almost truncate at apex; penultimate joint of maxillary and labial palpi triangular, much shorter than the last.... *Tristactus*, Konow.

Subfamily II.—Lydinæ.

This subfamily is at once distinguished from the *Megalodontinæ* by always having two parallel, deeply impressed lines on the vertex, and by the distinct intercostal vein in the front wings.

All of our species, so far discovered, belong in this subfamily, and all of the genera, tabulated below, occur in our fauna, except *Caenolyta* and *Gongylocorisa*.

The genera may be easily distinguished by the aid of the following table:

Table of Genera.

Claws cleft..... 3.

Claws not cleft, but with a small median or subapical tooth.

Anterior tibiæ without a lateral spur before apex..... 2.

Anterior tibiæ with a lateral spur before apex.

Temples immargined; second transverse cubitus interstitial with the transverse radius ..... *Lyda*, Fabr.

Temples, at least below, sharply margined .. *Itycorsia*, Konow.

2. Basal nervure uniting with the cubitus near its base; second transverse cubitus interstitial with the transverse radius or joining the radius a little *beyond* it ..... *Cephaleia*, Panzer.

Basal nervure uniting with the subcostal vein in the angle formed by the cubitus; second transverse cubitus uniting with the radius *before* the transverse radius .... *Cœnolyda*, Konow.

3. Intercostal vein forked at apex, the outer branch attaining the costal vein, the inner branch joining the subcostal vein and thus forming two closed basal cells ..... 4.

Intercostal vein with only the outer branch of the fork, therefore only one closed basal cell; basal nervure joining the cubitus near its middle.

Temples posteriorly rounded; transverse median nervure present; third antennal joint very long, as long as joints 4–9 or 10 united ..... *Gongylocorisa*, Konow.

Temples posteriorly sharply margined; transverse median nervure absent; third antennal joint not or scarcely longer than joints 4–6 united ..... *Neurotoma*, Konow.

4. Basal nervure joining the cubitus near its base .... 5.

Basal nervure joining the subcostal vein at the origin of the cubitus or in the angle formed by it; first joint of flagellum scarcely as long as joints 2–3 united; temples acutely margined ..... *Kelidoptera*, Konow.

5. First joint of flagellum not or scarcely longer than the second, or at least always much shorter than joints 2–3 united; temples margined ..... *Pamphilius*, Latreille.

First joint of flagellum as long or longer than joints 2–3 united; area of vertex always longer than wide.

Head punctate, the temples margined; second transverse median nervure always received by the first discoidal cell *beyond* its middle ..... *Bactroceros*, Konow.

Head polished, impunctate, the temples rounded behind, immargined; second transverse median nervure received by the first discoidal cell *at* or *before* the middle ..... *Liolyda*, Ashm., n. g.

(Type *L. frontalis*, Westw.)

Family VII.—Hylotominæ.

All the species belonging in this group or subfamily have always 3-jointed antennæ, the third joint in the female being simple, while in the male it is most frequently forked. Sometimes it is simple in the male as in the female, but in this case, however, it is as a rule more pointed at apex and more densely pubescent.

The 3-jointed antennæ readily distinguish the family, and must always be depended upon, since otherwise it approaches, in its thoracic and abdominal characters, very close to the *Lophyridæ*, *Perreyiidæ* and the *Selandriidæ*.

Since formulating my table for distinguishing the families I have discovered a new genus without an anal cell.

The family may be divided into two subfamilies as follows:

Table of Subfamilies.

Front wings without a transverse nervure in the costal cell.....Subfamily I., Schizocerinæ.

Front wings with a transverse nervure in costal cell.....Subfamily II., Hylotominæ.

Subfamily I.—Schizocerinæ.

This subfamily is readily distinguished by the absence of a costal transverse nervure. It comprises by far the greater number of genera and species, and is widely distributed throughout the globe, the species found in the tropics being especially handsome.

The numerous genera may be easily recognized by the aid of the following table:

Table of Genera.

Marginal cell appendiculate.....6.

Marginal cell not appendiculate.

Front wings with three submarginal cells.....5.

Front wings with four submarginal cells (rarely with the first transverse cubitus subobsolete).....2.

2. Lanceolate cell petiolate, the small cell at base obliterated by the short anal vein uniting with the median.....3.

Lanceolate cell longly contracted, nearly petiolate, but always with a small closed cell at base.

Second submarginal cell receiving both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus.....4.

Second and third submarginal cells each receiving a recurrent nervure.

Head seen from in front usually much broader than long; ♀ antennæ slender filiform, ♂ furcate.

Hind wings without an anal cell. *Sericocera*, Brullé.

Hind wings with an anal cell. . . *Schizocera*, Latreille.

Head seen from in front not or scarcely broader than long; second submarginal cell along the radius not longer than the third; hind wings with two discal cells; ♀ antennæ subclavate, ♂ furcate. . . *Cyphona*, Dahlbom.

3. Second submarginal cell much longer than the third, the latter quadrate; ♀ antennæ filiform, ♂ furcate. . . . . *Schizocera*, Latreille.

4. Second submarginal cell receiving the first recurrent, the second recurrent interstitial with the second transverse cubitus; middle and hind tibiæ with a lateral spur. . . . . *Scorbina*, Lepel.

4. Second submarginal cell receiving both recurrent nervures; middle and hind tibiæ without lateral spurs; hind wings with two discal cells; mandibles simple. . . . . *Pseudocyphona*, Ashm.,* n. g.

5. First submarginal cell receiving both recurrent nervures. *Themos*, Norton.

First and second submarginal cells each receiving a recurrent nervure. . . . . *Schizocera*, Latr.
= *Atomocera*, Say.
= *Sphecophilus*, Prov.

6. Front wings with four submarginal cells; if with three, which occurs only in a single genus in the ♂, the second transverse nervure wanting. . . . . 9.

Front wings with three submarginal cells, the first transverse cubitus wanting.

First and second submarginal cell each receiving a recurrent nervure. . . . . 7.

First submarginal cell receiving both recurrent nervures; hind wings with two discal cells, the first (in reality the first submarginal) about twice as long as the second. . *Dielocerus*, Curtis.

Second submarginal cell receiving both recurrent nervures. . . . . *Topotrita*, Kirby.

7. Middle and hind tibiæ with a lateral spur. . . . . 8.

* Type *P. Mexicana*.

Middle and hind tibiæ without a lateral spur; hind wings with two discal cells, the first much larger than the second.

Hind wings with a lanceolate cell..... *Ptilia*, Lepel. (= *Didymia*, Lep.)

Hind wings without a lanceolate cell..... *Gymnia*, Spinola.

8. Hind wings with two discal cells, the first much smaller than the second, the anal cell present..... *Trichorhachus*, Kirby.

9. Second submarginal cell receiving two recurrent nervures, or the second recurrent is interstitial..... 11.

Second and third submarginal cell each receiving a recurrent nervure; hind wings with two discal cells.

Hind and middle tibiæ with lateral spurs..... 10.

Hind tibiæ without lateral spurs.

Third submarginal cell much shorter than the second; hind wings without an anal cell..... *Hemidianura*, Kirby.

Third submarginal cell as long as the second or nearly so; hind wings with an anal cell..... *Athermantus*, Kirby.

10. Third submarginal cell shorter than the second; hind wings with an anal cell..... *Caloptilia*, Ashm., n. g. (Type *C. Townsendi*, Ashm.)

11. Hind tibiæ with apical spurs..... 12.

Hind tibiæ without apical spurs.

Head large, quadrate, the temples full and very broad; mandibles acute at tip; tarsal joints very short, joints 2–5 transverse..... *Pachylota*, Westwood.

12. Second submarginal cell receiving both recurrent nervures; middle and hind tibiæ without lateral spurs..... 13.

Second submarginal cell receiving only one recurrent nervure, the second recurrent interstitial.

Middle and hind tibiæ with a lateral spur; third submarginal cell much larger than the first and much broader at apex than the second..... *Acanthoptenos*, Ashm., n. g. (*A. Weithii*, Ashm.)

13. First and third submarginal cells rather small, subequal, the second elongate, the third quadrate or nearly so.

Claws simple..... *Ptenos*, Norton.

Claws bifid..... *Nematoneura*, André.

Third submarginal cell along the radius as long as the second, along the cubitus only half its length, the third transverse cubitus strongly curving outward and then upward; marginal cell broadly truncate at apex, so that with the long appendage it appears almost two-celled; hind wings with two discal cells, the second only about half the length of the first; claws cleft. ♂ with only three submarginal cells, the transverse cubitus entirely wanting, antennæ furcate ..... *Neoptilia*, Ashm., n. g.
(Type *N. mexicana*, Ashm.)

Subfamily II.—Hylotominæ.

This group closely resembles the former, but the presence of a short transverse nervure in the costal cell readily distinguishes it. It is a character common in the families which are to follow, and its position and shape or direction appears to be of great taxonomic value.

The genera recognized may be separated as follows:

Table of Genera.

Marginal cell appendiculate ..... 3.
Marginal cell not appendiculate ..... 2.

2. Front wings with three submarginal cells, the first and second each receiving a recurrent nervure; middle and hind tibiæ without a lateral spur; third antennal joint in ♂ furcate... *Micrarge*, Ashm., n. g.
(Type *A. ruficollis*, Nat.)

3. Cubitus originating from the apex of the basal nervure or in the angle formed by it and the subcostal vein ..... 4.

Cubitus originating from the subcostal vein more or less remote from the apex of the basal nervure.

Front wings with four submarginal cells, the second and third each receiving a recurrent nervure ..... *Hylotoma*, Latreille.
(Section I.)

4. Front wings with four submarginal cells, the second and third each receiving a recurrent nervure.

Hind wings with a lanceolate cell; middle and hind tibiæ with a lateral spur ..... *Hylotoma*, Latreille.
(Section II.)

Hind wings without a lanceolate cell; middle and hind tibiæ without a lateral spur ..... *Gymniopterus*, Ashm., n. g.
(Type *G. singularis*, Ashm.)

DESCRIPTIONS OF NEW GENERA AND SPECIES OF THE GEOMETRINA OF NORTH AMERICA.

BY GEO. D. HULST, BROOKLYN, N. Y.

(Continued from page 195.)

SELIDOSEMA NIGRESCENS, n. sp

Expands 31–33 mm. Palpi and front dark fuscous; antennæ black above, fuscous below; thorax dark fuscous, patagiæ lighter; abdomen dark even fuscous. All wings dark fuscous, made by heavy coalescing striations of fuscous and blackish on a light fuscous ground; basal line black, quite distinct, rounded, wavy; a median shade passing through distinct black discal spot; an outer black distinct cross line, continued across hind wing, on fore wing sinuous, subparallel with outer margin, on hind wing nearly or quite straight; on fore wing beyond this line is a broad reddish-brown band, not always clear, however, sometimes showing faintly at middle of hind wing; a submarginal row of light, not distinct, lunules, edged within with darker; marginal lines black, distinct. Beneath fuscous, with faint line shadows, and a dark shadow spot near apex of fore wings.

San Antonio, Texas. The generic reference is provisional, as all the specimens before me are females.

CONIODES PLUMIGERARIA, Hulst.

This insect was described from the ♂ only as *Boarmia plumigeraria*, Ento. Am. III., 216, 1887. In Bull. No. 7, new series, U. S. Dept. Agric., p. 64, 1897, Mr. Coquillet publishes a life-history of the insect, and gives us the information, apart from larval history, that the female is wingless. I have received a specimen of the ♀ from the National Museum collection, which I herewith describe.

Palpi short, rather light, separate, black or blackish-gray; front broad, black with a few gray scales; tongue very short, weak; thorax blackish-gray, short, rather stout; abdomen blackish-gray, very short and heavy; antennæ filiform, blackish-gray, loosely scaled; wings undeveloped, about as long as the thorax, blackish-gray, though lighter than thorax and abdomen; legs blackish-gray, rather long, slender, hind tibiæ with two pairs of spurs; the abdomen is armed with chitinous spines, not very stout, quite numerous over the whole segment, but hidden in the covering scales. Upon closely examining the male I find that it also has the abdomen armed with spines as in the female.

The insect, by the wingless female and as well the abdominal armature, is allied very closely to the genera of the *Phigalia* group. The genus *Coniodes* is, however, sufficiently distinct from *Rhaphidodemas* in the almost obsolete tongue and the male antennæ pectinated to the tip.

PHENGOMMATÆA DISSIMILIS, n. sp.

Expands 33 mm. Palpi and front white; thorax and abdomen white; all wings above and below of an even, smooth cream white, the fore wings above being of a somewhat deeper shade.

Glenwood Springs, Colo.; from Dr. Barnes.

RIPULA VESTALIS, n. sp

Expands 40–42 mm. Palpi whitish below, black above; front black, or white below, black above, thorax, abdomen and all wings, above and below, pure, unbroken, silky white; antennæ fuscous, fore and middle legs black at end of femora, otherwise pure white, except some black on tibial epiphysis of fore legs.

South Florida; from Mrs. A. T. Slosson.

THERINA PUNCTATA, n. sp.

Expands 42 mm. Palpi very short, fuscous; front fuscous ochre, bright reddish ochre at summit; thorax, and abdomen light fuscous ochre; fore wings ochre, with fuscous striations, veins with an orange-ochre shade; inner line of blackish points, not distinct; outer line of black points, with an outer orange shading, sinuous, subparallel with outer margin; discal spot faint; hind wings ochre, with faint cross line; beneath even ochre yellow with fuscous tinge, lines and spots obsolete.

Glenwood Springs, Colorado; from Dr. Barnes. Near *T. vitrina*, Grt., but much larger, wings more extended, much more thickly scaled, and outer line much more sinuous.

NEOTERPES EPHELIDARIA, var. *Kunzei*, n. var.

I have received from Dr. Kunzé a number of specimens of *N. ephelidaria*, Hulst, in which the whitish colour of the fore wings is replaced with yellow, varying somewhat in brightness. The specimens vary also in the lines, in the most these being quite evident as in *N. ephelidaria*, but in some specimens they are almost obsolete. In one case the fore wings approach *N. Edwardsata*, Pack., in appearance in some of its lighter marked forms. It may, therefore, be a variety connecting the two species.

EUGONOBAPTA CONSTANS, n. sp.

Expands 32 mm. Palpi fuscous, tipped with white; front gray; thorax and abdomen clay colour, the latter more ochreous; fore wings broad, falcate, angulate at vein 4, dull clay colour, more or less stained and striated with fuscous, this darkening into a rounded indeterminate basal band, and a better marked, though still indefinite, outer band running nearly to apex; margin ochre-clay colour; hind wings strongly angled at vein 4, of the same colour as fore wings, outer band continued from and like that of fore wings, and a faint submarginal shading; discal spots on all wings of dark points; beneath as above, the colours sharper, and the lines somewhat more determinate.

Prescott, Ariz.; from Dr. Kunzé; taken Aug., 1896.

EUGONOBAPTA OCHREATA, n. sp.

Expands 33 mm. Size and shape of *E. constans*, Hulst. Colour bright ochre, clear and even; inner line reddish-ochre, faint; outer line reddish-ochre, fine, subparallel with margin; beyond outer line a row of blackish blotches; hind wings colour of fore wings, outer line the same, nearly straight, and at middle of wings, with two or three blackish blotches beyond towards inner margin; beneath bright ochre, outer line scarcely showing, the blotches obsolete.

Senator, Ariz.; from Dr. Kunzé; taken Aug. 20, 1896.

SLOSSONIA, n. gen.

Palpi long, extended, beaklike; tongue very short, weak; front tufted; antennæ bipectinate in ♂, apex simple, serrate in ♀; thorax and abdomen untufted; fore tibiæ unarmed; hind tibiæ swollen, without hair pencil, with two pairs of spurs; fore wings angulate in ♂, rounded and subfalcate in ♀, without fovea below in ♂; 12 veins: 3 and 4 separate, 5 near middle of cell; 6 separate from 7; 10 and 11 from cell separate from 9 and 12; hind wings, 5 obsolete, 6 and 7 separate, 8 separate from cell. Type *S. rubrotincta*, Hulst.

The ♀ of the type is wanting; the determination of the ♀ is from *S. latipennis*, Hulst, which, as the ♂ is not known, may not belong here.

This generic name is with very great pleasure given in honour of Mrs. Annie Trumbull Slosson, of New York, who has not only added very greatly to our knowledge of the American insect world, especially of Southern Florida and the White Mountains of New Hampshire, but has herself also done some excellent descriptive and critical work. To this I

may add my appreciation of her charming personality, of her high standing as an author in the literary world, and of her very large generosity in favours which are personal to myself.

SLOSSONIA RUBROTINCTA, n. sp.

Expands 30 mm. Palpi bright ochreous, tinged on sides by reddish-purple; front ochreous; antennæ ochreous, tinged at base above with reddish-purple; thorax and abdomen light clear ochre. Fore wings broad, angled on outer margin at vein 4, clear light ochre with purple-red stain at base, on costa, and two purple-red costal stains marking the beginning of otherwise obsolete cross lines; apex more yellow. Hind wings angulate at vein 4, broad, light clear ochre; discal spots and marginal lines obsolete. Beneath in colour as above, the hind wings sparsely dotted in the blackish scales, thickening to a diffuse black spot along inner margin. All legs ochre, stained especially on tibiæ with purple-red.

Los Angeles Co., Cal.; taken in July; type in National Museum, No. 3943.

SLOSSONIA LATIPENNIS, n. sp.

Expands 33 mm. Palpi long, slender, ochreous, tipped with black; front ochre; thorax yellowish; abdomen ochre-white; fore wings broad, even, rounded, ochreous, stained with yellow at base, a faint edging of blackish basally on costa, and a faint indication of a straight oblique whitish line beginning at costa close to apex. Hind wings ochreous, a little yellow stained on middle portion, with a faint, somewhat rounded line as on fore wings; discal spots fine, jet black; all wings very broad, the hind wings with especially long inner margin and distinct posterior angle. Beneath all wings light ochreous, the fore wings somewhat yellow at base and apex, discal spots black, some black scales on hind wings between discal spot and inner margin; legs as far as seen whitish-ochreous, with tibiæ stained with black.

Cocoanut Grove, S. Fla. Type in National Museum, No. 3956.

SYNAXIS FUSCATA, n. sp.

Expands 48 mm. Palpi dark fuscous; front whitish; thorax ochreous fuscous; abdomen fuscous; fore wings dirty fuscous, between the cross lines darker, forming a cross band; discal spots black; hind wings fuscous except along fore margin; cross line broad, not strongly marked, reaching from inner margin half across wings, discal spots black.

Beneath lighter fuscous, more even, the hind wings more loosely striated, and all with more of an ochreous tinge.

Glenmore Springs, Colorado; from Dr. Barnes; taken between Sept. 16 and 23.

ENNOMOS OCHREATUS, n. sp.

Of the size and shape of *E. magnarius*, Guen., but of an even bright ochre colour, scarcely darkening into darker ochre along outer margin and faintly on outer line, the colour being almost exactly the same below. This may be an extreme variety of *E. magnarius*, of which I have received a number of specimens from Colorado and Utah, but all these, though lighter than the Eastern form, have the lines distinct and the colours deeper and are quite uniform.

Colorado; from Dr. Gillette.

METANEMA SUBPUNCTATA, n. sp.

Expands 32 mm. An insect of the size and shape of *M. excelsa*, Streck., with the ground colour of fore wings white, heavily overlaid with fuscous striations, which have a violet tinge; lines as in *M. excelsa*, edged with fuscous, the basal on the outside, the outer on the inside; outer margin brownish; hind wings stained whitish. Beneath in colour much as above, the fore wings less striated; the hinds wings much more.

California.

MARMAREA PEPLARIOIDES, n. sp.

Expands 43 mm. An insect comparing with *M. occidentalis*, Hulst, much as *Azelina peplaria*, Hub., compares with *A. hubnerata*, Gn. The general colour is a bright bluish-mouse colour, the base darker, the middle field a broad bluish-black band; discal spot white; outer line of hind wings whitish with an inner edging of blackish. Beneath bluish, the hind wings much striated. It may be, and indeed probably is, a variety of *M. occidentalis*, though decidedly different in appearance.

San Francisco Mts., Ariz.; from Dr. Kunzé; taken July 23rd, 1897.

STENASPILATES INVIOLATA, n. sp.

Of the size and general appearance of *S. radiosaria*, Hulst, but the colour is pure white, overlaid with an even light fuscous tinge. The basal line is wanting, the outer line is white, edged within with fuscous, nearly straight, and on all wings. Hind wings white at base, fuscous tinged outwardly; abdomen clay white; beneath as above.

Phœnix, Ariz., May 30th; from Dr. Kunzé. Very much lighter in colour than *S. radiosaria*, and differing in the ground colour entirely.

CABERODES MINIMA, n. sp.

Expands 28 mm. Palpi white, with a few scattered black scales intermixed; front white, tinged with fuscous; antennæ fuscous; thorax and abdomen light fuscous, the abdomen with some black scales; fore wings light fuscous ochre, with scattered blackish scales and striations; basal cross line rounded, not prominent; outer cross line heavy, black, nearly parallel with outer margin, a little emphasized on the veins; a slight costal spot near apex; discal spot large, prominent, black, with a slight central ochre point; hind wings white, faintly fuscous stained, with scattered fuscous scales, outer line broad, dark, parallel with outer margin; discal spot apparent, but not prominent. Beneath of the ground colour above, with outer lines and discal spots of all wings present but faint.

Arizona; quite different in appearance from the ordinary *Caberodes*.

NOTES ON CHLOROTETTIX, WITH SOME NEW SPECIES.

BY C. F. BAKER, AUBURN, ALA.

Chlorotettix unicolor, Fitch.—An examination of the Fitch type in the National Museum shows this to be the form described by Mr. Van Duzee as *galbanata*. As this will leave Mr. Van Duzee's *unicolor* without a name, it may be known as *Vanduzei*. *Vanduzei* differs from all the other described species in a character not before noted,—the ocelli are distant from the eyes,—while in all the others they are about as near as their own width or nearer. Differing thus widely from other species referred here, *Vanduzei* must still remain the type of the genus, which should perhaps be used for it alone. The male of *unicolor*, Fh., closely resembles in genital characters that of *spatulatus* which I have from Kansas and Texas.

Chlorotettix emarginata, n. sp.

Length, 6.25–6.5 mm. Vertex blunter than in *unicolor*; colour the same. Valve in male triangular and about the length of preceding segment. Plates about equalling pygofers, rounded at tips, but little wider towards the base, where each plate is suddenly depressed, giving the whole the appearance, as viewed from below, of being strongly constricted. Last ventral segment of female with lateral angles strongly produced backwards on either side of a broad, deep, rectangular emargination, the bottom of which is sinuate. Ovipositor equalling pygofers. Ocelli approximating eyes.

Described from two males and one female collected at Medellin, State of Vera Cruz, Mexico, by Rev. H. Th. Heyde. Resembles

unicolor, Fh. (=galbanata, Van D.), but is slightly larger and differs widely in the form of the genitalia, both male and female.

Chlorotettix breviceps, n. sp.

Length, 6.25 mm. Vertex not longer at middle than at eyes. Ocelli black, scarcely further than their width from the eyes. Colour throughout pale brownish; two longitudinal whitish lines on scutel. Last vental segment twice the length of preceding, hind margin very broadly, slightly notched. Ovipositor about equalling pygofers.

Described from two females in the Herbert H. Smith collection, taken at Chapada, Brazil, in May. Nearest *viridia*, but the vertex shorter, the ocelli smaller and further from the eyes, and the colour different. This insect has somewhat the aspect of an *Idiocerus*.

Chlorotettix minima, n. sp.

Length, 5 mm. or slightly more or less. Ocelli large and very close to the eyes. Vertex distinctly, though but little, longer at middle than at eyes. Colour pale yellowish. Last ventral segment of female twice the length of preceding, lateral angles broadly rounded; medially with a deep narrow notch, extending more than half the length; the angles on either side of the summit of the notch projecting obliquely towards each other and sometimes nearly touching; in one specimen these projecting angles are nearly obsolete. Valve of male shorter than preceding segment and scarcely angled at middle. Plates rounded basally at sides, beyond middle becoming suddenly narrow and parallel-sided for rest of length.

Described from one male and several females in the Herbert H. Smith collection, taken at Chapada, Brazil, in April and May. The smallest species of the genus yet described. The form of the ventral notch varies, as it does in most species of the genus. In general form the species recalls *unicolor*, Fitch.

SOME NEW SPECIES OF COCCIDÆ.

BY J. D. TINSLEY, MESILLA PARK, N. MEX.

DACTYLOPIUS QUAINTANCII, n. sp.

Adult ♀. Length, 2 mm. Width, 1.5 mm. Shape, ellipsoidal, much flattened. Colour, dark grayish-brown, the body is so covered with white secretion that its true colour only shows on the ventral surface, the colour of the dorsum appearing quite white. The white secretion mealy, projecting slightly on the lateral margins, but not forming well-marked filaments; posteriorly it is produced into two very short, but well-defined, caudal filaments; on the dorsum it is slightly raised into a longitudinal ridge.

In addition to the mealy secretion, there is some fine, waxy, thread-like secretion as in *D. virgatus*, Ckll. They produce no well-defined ovisac, only a fluffy mass of secretion.

Boiled in caustic potash they become, at first, almost black, and on further boiling they become purplish. Legs and antennæ brownish, but very much lighter than the body.

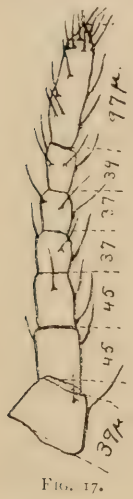


Fig. 17.

Antennæ 7-jointed: 7 longest, slightly longer than 2 + 3 (90–100 μ); 2 and 3 next longest, usually subequal, about twice as long as broad; 1 and 6 next longest, often subequal, 1 sometimes the longer; 4 and 5 shortest and usually subequal. The antennæ are fairly stout, especially joints 1, 2 and 3; all joints are hairy, the hairs being long and slender. Antennal formula 7(23)(16)(45). (See Fig. 17.)

Legs.—Femur very stout, being only about twice as long as broad, with scattered, long, slender hairs; tibia stout, its width about half that of the femur, with a few long, slender hairs; tarsus stout, quite hairy, bearing a pair of long, slender digitules; claw stout, bearing a pair of knobbed digitules. Leg resembles that of a *Ripersia*. (See Fig. 18.) Male unknown.

Habitat.—Lake City, Florida, Feb. 9, 1898. On Rhus copallina, L.; collected by Mr. A. L. Quaintance.

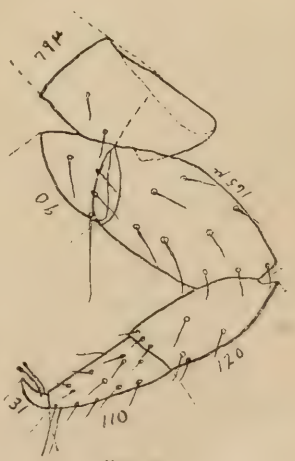


Fig. 18.

Remarks.—The most prominent characteristics of this species are: Its small size, stoutness of legs and antennæ, and the comparatively great length of the terminal joint of the antenna.

DACTYLOPIUS VIRGATUS, Ckll.

Some time since I received from Mr. E. E. Green, of Ceylon, specimens of *Dactylopius ceriferus*, Newst., and, having at hand the type material of *virgatus*, I carefully compared them, both as to their external features and their antennæ and legs.

The specimens from either Jamaica or Ceylon differ as much in size and colour among themselves as they differ from those of the other locality.

The Jamaica specimens agree quite closely with Mr. Newstead's description, and *vice versa*.

To form an idea of the variability of this species one has only to note the fact that Mr. Cockerell distinguished four varieties in addition to the typical species growing on various plants in Jamaica.

The most prominent characters, which are constant, are, first, the elongated shape, tapering posteriorly, and second, the presence of the peculiar waxy filaments which are quite distinct from the ordinary white filamentous secretion of the genus.

The antennæ are quite variable, as may be seen from the following measurements of the type material from Jamaica: First joint, 45–60 μ; second, 55–80 μ; third, 85–95 μ; fourth, 45–55 μ; fifth, 50–65 μ; sixth, 55–60 μ; seventh, 53 μ; eighth, 115–120 μ.

Measurements of the Ceylon material vary as follows: First joint, 59–65 μ; second, 67–76 μ; third, 90–104 μ; fourth, 53–57 μ; fifth, 53–65 μ; sixth, 51–62 μ; seventh, 56–62 μ; eighth, 120–127 μ. I have also recently examined specimens from Mexico, and find them to fall between the Jamaica and Ceylon specimens in size. It will be noticed that the Ceylon specimens are longer than those from Jamaica.

The variations in relative length are well shown in the following antennal formulæ:

Jamaica specimens.	*Ceylon specimens.*	*Mexico specimens.*
(83)(24)(567)	382(4567)	832(45)(16)7
83267(45)	83216745	8324(16)57
83(26)(57)14	8321(67)54	
832(156)47	83245716	
832(4567)		

Joint 3 of the antenna is, however, always quite long, always appreciably longer than 2.

Legs agree perfectly with the published descriptions.

After this careful examination, I am convinced that these are all one species, and since Mr. Cockerell published his *virgatus*, about a year previous to Mr. Newstead's publication of *ceriferus*, *D. ceriferus*, Newst., will stand as a synonym for D. virgatus, Ckll.

The Mexican specimens were collected on coffee at Cuantia, Morelos,

Mexico, July, 1897, by Mr. A. Koebele, and sent to the New Mexico Expt. Station by Mr. L. O. Howard. This is the first time that *D. virgatus*, Ckll., has been found in Mexico.

PHENACOCCUS MINIMUS, n. sp.—Adult ♀. Length about 1 mm. Shape, somewhat globular. Colour, reddish-pink.

Body nearly naked, and shining. No lateral filaments; a pair of short, stout, flattened, caudal filaments.

Antennæ (see Fig. 19) of 9 segments: segment 9 longest: segments 2 and 3 next longest, these may be subequal, or three may be the shorter; segment 1 next, and fairly stout; segment 6 about same length as 1, although it may be a little shorter; segment 7 next; segments 4, 5 and 8 subequal, and shortest.

Formula 9(23)167(458). Segments of antennæ with very long, fine hairs. While the fully-developed antennæ have 9 segments, and are well represented in the figure, yet a large proportion of the individuals examined have 7 and 8 segments. Those with 8 segments are due to the failure of segment 8 to divide. Those with 7 are due to lack of division in 3 and 8. The division in the 8th segment (terminal segment) is never so distinct as that between the other segments.

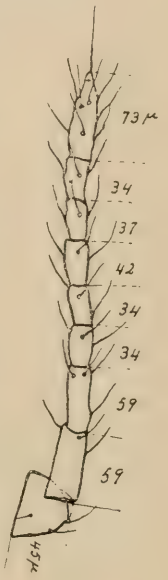


FIG. 19.

Legs.—Femur, length 185 μ, width 50 μ; with some long, slender hairs. Tibia, length 185 μ, width 30 μ, with rather slender hairs. Tarsus, length 85 μ, proximal end nearly as wide as tibia, tapering toward the distal end to join the slender claw; hairs similar to those on tibia; a pair of slender hair-like digitules, not knobbed. Claw, length 25 μ, slender, with a small denticle on its inner face. A pair of slender, knobbed digitules longer than the claw.

Anal ring normal. Anal lobes well developed.

Ovisac.—Apparently without definite shape, just a fluffy mass of fairly coarse filaments, enclosing the pale yellow, almost white, eggs, and partially enclosing the female.

Male unknown.

Habitat.—On silver spruce, *Picea pungens*, Engelm. The specimens were near the end of the twig on one side, at the base of the needles, and had apparently caused the death of the needles.

Collected by Prof. C. P. Gillette, at Fort Collins, Colo., May 20, 1898.

The minute size of this species easily distinguishes it from any species known at present. Unless considerable care is exercised only the 7- and 8-segmented antennæ will be found, and one would, from this, be inclined to call it a *Dactylopius*.

Note on a Chalcidid of the Subfam. Encyrtinæ, Parasitic on Phenacoccus minimus.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Tetracnemus Westwoodi, n. sp.— ♂. Length $1^1/_5$ mm.; dark brown; head and thorax minutely reticulated; ocelli large and prominent, lateral ocelli nearer to the eyes than to the middle ocellus; scutellum prominent; scapulæ triangular, produced to a point mesad, failing to meet by a short interval only; coxæ large and swollen, trochanters small, legs long, tarsi five-jointed. Antennæ 8-jointed, or 10 jointed if the two ring-joints are counted; first joint of flagellum subglobose, short; second about as long, but cylindrical; third about twice as long as second; fourth about one-third longer than third; fifth about as long as fourth; sixth (club) a little longer. First four joints of flagellum emitting long branches as in Westwood's figure of *T. diversicornis*. Club slender, considerably less swollen than in *diversicornis*. Wings strongly pubescent.

Hab.—Fort Collins, Colo; parasitic in *Phenacoccus minimus*, Tinsley; collected by Prof. Gillette. Prof. Tinsley directed my attention to this interesting parasite, which he found when describing the *P. minimus*. The parasite is almost as large as the host, and always occurs singly. Prof. Tinsley observes that the head of the parasite is invariably turned to the tail of the *Phenacoccus*. The only specimens yet available for study are those mounted (after boiling) with the coccids, still enclosed in the skin of the host, though fully formed in every respect. It may be that specimens preserved in the usual way will show a somewhat different coloration, but the structural details will not be altered. The species is dedicated to the founder of the genus, who was the greatest of English entomologists. It differs in the scapulæ, the antennal club, and some other particulars, from *T. diversicornis*. The genus is new to America. (See L. O. Howard, Proc. U. S. Natl. Museum, XV., p. 362.)

Since the description of *Tetracnemus Westwoodi* was written, we have received many living specimens, of both sexes, from Prof. Gillette. The living insect is black, with a slight metallic tinge, the mesothorax a bluish-black, the scutellum purple-black, rather sharply contrasting. Antennæ of ♂ dark brown; of ♀, with scape and club, brown-black, the intermediate portion white. Legs yellowish-white, tarsi more or less infuscated, hind femora black.—T. D. A. C.

Mailed August 9th, 1898.

The Canadian Entomologist.

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CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 4.)

Family VIII.—Lophyridæ.

The Swedish entomologist, C. G. Thomson, first separated this family as a tribe in 1871. It had been placed previously with the *Lydides*, with which it had no affinity whatever. In the structure of the head, thorax and abdomen the species approach closest to the *Hylotomidæ*, *Perreyiidæ* and the *Pterygophoridæ*. The multiarticulate antennæ, however, separate them at once from the former; the distinct anal cell in the hind wings separates them from the *Perreyiidæ*, which have none; while from the last, to which they are undoubtedly most closely allied, they are readily distinguished by having a distinct lanceolate cell in the front wings.

The larvæ are social in their habits and feed exclusively upon coniferous trees—the pines, firs and cedars. Only two or three species are known outside of the Palearctic and Neartic regions.

But two genera are known, distinguished as follows:

Table of Genera.

Hind wings with two discal cells; front wings with the second and third submarginal cells each receiving a recurrent nervure.

Lanceolate cell with a straight or an oblique nervure; ♂ antennæ ramose ..... *Lophyrus*, Latreille.

Lanceolate cell contracted at middle, closed; ♂ antennæ biramose ..... *Monoctonus*, Dahlbom.

Family IX.—Perreyiidæ.

The absence of an anal cell in the hind wings readily separates this family from the *Lophyridæ*.

The group was first recognized by Cameron as a subfamily in 1883, who, however, placed in it only three genera, viz.: *Decameria*, *Lophy-*

roides and *Perreyia*. He says: "This group has usually been regarded as a section of the Lophyrina; but it differs in so many points not only from that group, but from all others, that I am justified, I think, in making a distinct section of it, and have given above the distinctive characters of the subfamily."*

Below I have placed in the group several other genera placed elsewhere by Cameron and Kirby. No species is known in our fauna, and the group, as a whole, seems to be confined to the Neotropical and Australian regions.

The genera belonging to the family may be readily distinguished by the aid of the following table:

Table of Genera.

Marginal cell simple, not appendiculate.....7.
Marginal cell appendiculate, the lanceolate cell petiolate.
Second and third submarginal cells each receiving a recurrent nervure, rarely with the first recurrent interstitial with the first transverse cubitus.....3.
Second submarginal cell receiving both recurrent nervures; antennæ 13–15-jointed.....2.
2. Hind wings without a discal cell, the marginal cell with an appendage; ♂ antennæ 15-jointed, biramose.....Lophyroides, Cameron. (Type L. ruficollis, Cam.)
Hind wings with one discal cell, the marginal cell *without* an appendage; ♀ antennæ 14-jointed, ♂ 15-jointed; maxillary palpi 4-, labial palpi 3-jointed.....Lophyridea, Ashm., n. g. (Type L. tropicus, Nort **)
Hind wings with one discal cell, the marginal cell *with* an appendage; antennæ 15-jointed in both sexes; maxillary palpi 2-, labial palpi 1-jointed.....Perreyia, Brullé.
3. Hind wings *with* one discal cell (a closed submarginal).....4.
Hind wings *without* a discal cell.
♀ antennæ 13-jointed, the third joint very long, the following gradually shortening.....Ancyloneura, Cameron.
4. Antennæ 16-jointed, longer than the body.....6.
Antennæ 9–11-jointed, shorter than the body.....5.

*Biol. Centr. Am. Hym., Vol. I., p. 60.

**Cameron placed this species in his genus *Lophyroides*.

5. Antennæ 9-jointed, the third joint as long as joints 4–6 united; second and third submarginal cells subequal, larger than the first. ♀ ..... Eurys, Newman.

Antennæ 10-jointed, the third joint scarcely as long as joints 3–4 united; second submarginal cell twice as long as the third. ♀ ..... Acherocerus, Kirby.

Antennæ 11-jointed, the third joint long, about as long as the three following joints united.

Second submarginal cell longer than either the first or third united; maxillary palpi 6-, labial palpi 4-jointed. ♀ ..... Camptobrium, Spinola.

Second submarginal cell shorter than either the first or third.

Maxillary palpi 4-, labial palpi 3-jointed. ♀ ..... Euryopsis, Kirby.

Maxillary palpi 3-, labial palpi 1-jointed. ♀ ..... Decameria, Lepel.

6. Head subquadrate, the temples broad; flagellar joints long, each giving off a ramus from near the base. ♂ ..... Cladomacra, Smith.

7. Antennæ 18-jointed, the flagellar joints scarcely longer than thick, each throwing off from near the extremity a long pilose ramus; hind wings with one discal cell; head transverse, the temples narrow. ♂ ..... Polyclonus, Kirby.

Family X.—Pterygophoridæ.

This group by most authorities has been placed with the *Cimbicidæ*, possibly on account of some of the species possessing clavate antennæ, similar to *Cimbex*. The family is, however, structurally, totally different from them, and to me shows no affinity whatever with the *Cimbicidæ;* it is in every respect more closely allied to the *Lophyridæ*, *Perreyiidæ* and the *Selandriidæ*, from all of which it is readily distinguished by the absence of the lanceolate cell in the front wings.

It may be divided into three subfamilies, two of which, however, are not sharply separable, and I have had some difficulty in finding characters to distinguish them. The venation, especially in many of the genera in the subfamily *Pterygophorinæ*, has been most perplexing, since I find it totally different in the opposite sexes of the same species. Some of the females too have clavate antennæ, and thus closely mimic the females in the subfamily *Perginæ*.

It is believed, however, that these difficulties have been surmounted and that other students will now have no trouble in recognizing these subfamilies by the use of the following table:

Table of Subfamilies.

Cubitus originating from the subcostal vein beyond the apex of the basal nervure.....2.

Cubitus originating from the apex of the basal nervure or only a little away from it.

Costal vein slender towards base, but very much thickened or broadened at apical one-third; marginal cell not appendiculated and with no space between its apex and the costal margin; antennæ short, filiform in both sexes, from 6–10-jointed.....Subfamily I., Lobocerinæ.

Costal vein not very much thickened and almost of a uniform thickness throughout; marginal cell at apex a little away from the costal margin, and appendiculated; first dorsal abdominal segment emarginate, or with a median slit; ♀ antennæ short clavate, 5–8-jointed, or filiform subdentate, 14–20-jointed; antennæ usually ramose or flabellate.....Subfamily II., Pterygophorinæ.

2. Submedian cell always shorter than the median, the transverse median nervure joining the median vein very much *before* the origin of the basal nervure; ♀ antennæ filiform, the flagellar joints subdentate beneath, or clavate; ♂ antennæ flabellate or ramose; first dorsal abdominal segment with a median slit.....Subfamily II., Pterygophorinæ.

Submedian and median cells equal or nearly so, the transverse median nervure being interstitial with the basal nervure; antennæ short clavate in both sexes, 6- or 7-jointed; first dorsal abdominal segment entire.....Subfamily III., Perginæ.

Subfamily I.—Lobocerinæ.

This group, but without proper characterization, was first recognized as a subfamily by Mr. W. F. Kirby, of the British Museum, who placed in it only three genera, viz.: *Perantherix*, Westw. (= Acordulecera, Say); *Loboceras*, Kirby. and *Aulacomeres*, Spinola. The other genera, recorded below, he placed with the Cimbicidæ.

The subfamily is very sharply separated from the other two subfamilies, here defined for the first time, by the characters made use of in my table.

The group is confined principally to the Neotropical region, no species being known outside of the American faunæ — North, Central and South America—*Acordulecera*, Say, being the only genus which has been enabled to extend its range into the Palearctic region.

The larvæ of at least one of the genera is known: *Acordulecera dorsalis*, Say, having been bred and described by Dr. H. G. Dyar.*

The genera may be easily recognized by the use of the following table:

Table of Genera.

Hind wings with one closed submarginal cell.

Front wings with four submarginal cells, the second and third each receiving a recurrent nervure..... ..2.

Front wings with three submarginal cells, the first and second each receiving a recurrent nervure.

Antennæ short, 6-jointed; middle and hind tibiæ with lateral spurs.....Acordulecera, Say (=Perantherix, Westw.).

2. Antennæ 8-jointed or more.. .....3.

Antennæ 7-jointed.

First joint of flagellum not so long as joints 2–3 united; hind tibiæ without a lateral spur, the inner apical spur very long ....Loboceras, Kirby.

First joint of flagellum longer than joints 2–3 united; hind tibiæ with a lateral spur.....Incalia, Cameron.

3. Antennæ 8-jointed; middle and hind tibiæ with lateral spurs .. ..Paralypia, Cameron.

Antennæ 9-jointed; middle and hind tibiæ without lateral spurs.....Aulacomerus, Spinola.

Antennæ 10-jointed, the third joint about as long as joints 4–5 united, or a little longer, but slenderer; middle and hind tibiæ with lateral spurs.....Cerealces, Kirby.

Subfamily II.—PTERYGOPHORINÆ.

The credit for this subfamily should be given to Mr. Peter Cameron, who, in his Monograph of the British Phytophagous Hymenoptera, Vol. III., p. 72, remarks as follows: "*Pterygophorus* also belongs to a distinct subfamily, which differs both from the *Lophyrina* and *Perreyina* in the lanceolate cell being obsolete. The accessory nervure in the hind wings is also absent; the latter have only one middle cellule and the anterior are appendiculated."

*CAN. ENT., Vol. XX., 1895, p. 208.

The subfamily is apparently confined to the Neotropical and Australian regions, no species being known in our fauna north of Mexico. The genera recognized may be tabulated as follows:

Table of Genera.

Front wings with three submarginal cells.....2.

Front wings with four submarginal cells, the hind wings with one closed submarginal cell (except in Syzygonia, Klug, which has two).

Second and third submarginal cells each receiving a recurrent nervure .....4.

Second submarginal cell receiving both recurrent nervures.....3.

2. First and second submarginal cells each receiving a recurrent nervure; hind wings with one closed submarginal cell; antennæ 6-jointed .....Thulea, Say.

Second submarginal cell receiving both recurrent nervures; hind wings with one closed submarginal cell; scutellum rounded behind.

Antennæ 17–20-jointed, the flagellar joints dentate or with short branches beneath.....Lophyrotoma, Ashm., n. g.
(Type P. interruptus, Klug.)

Antennæ 23-jointed, each flagellar joint with a very long branch. ♂.....Pterygophorinus, Ashm., n. g.
(Type P. analis.)

3. Scutellum with the hind angles dentate; antennæ 25-jointed, flabellate. ♂.....Pterygophorus, Klug.
(Type P. cinctus, Klug.)

Scutellum posteriorly rounded, not dentate; antennæ 17–20 jointed, biramose in ♂..... Brachytoma, Westw.
(Type B. fumipennis, Westw.)

4. Middle and hind tibiæ with lateral spurs.....5.

Middle and hind tibiæ without lateral spurs.

Antennæ 5-jointed, ♀; hind wings with one closed submarginal and one closed discoidal cell.....Syzygonia, Klug.
(Type S. cyanocephala, Klug.)

Antennæ 6-jointed, ♀; hind wings with one closed submarginal cell, but *without* a closed discoidal cell..Syzygonidea, Ashm., n.g.
(Type S. cyanea, Brullé.)

5. Scutellum rounded behind, unarmed.

Antennæ 7-jointed.....Corynophilus, Kirby.
(=Cephalocera, Klug.)

Antennæ 14-jointed, ♀; third submarginal cell very small, less than half the length of the second.....Brachytoma, Westw.

Scutellum posteriorly bidentate.

Antennæ 8-jointed (or ? more), clavate. ♀..Pterygophorus, Klug.

Antennæ 18-jointed, in both sexes, filiform, subserrate, the third joint longer than the fourth.....Philomastix, Froggatt.

Subfamily III.—PERGINÆ.

In this subfamily the antennæ are 6- or 7-jointed, clavate, and alike in both sexes; the cubitus always originates from the subcostal vein away from the apex of the basal nervure; the costal vein is considerably thickened; while the transverse median nervure is interstitial, or very nearly so, with the basal nervure.

These characters at once separate the group from the two preceding.

The larvæ too, judging from what has been published respecting them, are also quite different. Unfortunately, the published descriptions of them are very superficial and one can gain little information respecting their structure. Most of them seem to be black or brown, with yellow markings and clothed with short white hairs, which would indicate an affinity with the *Selandriidæ*. According to Mr. R. H. Lewis and Mr. W. W. Froggatt, they live on various species of gum trees belonging to the genus *Eucalyptus* — trees indigenous to Australia.

A most remarkable habit of maternal insect in the female of *Perga Lewisii*, Westw., and the only case known among the Terebrant Hymenoptera, is recorded by Mr. Lewis.* He says: "The larvæ when hatched are of a dirty green colour, with shining black heads; they keep together in the brood, arranging themselves in oval masses, their heads pointed outwards; but sometimes I have seen them arranged on both sides of the leaves, their heads pointed towards the edges. . . . . The mother insect follows them, sitting with outstretched legs over her brood, preserving them from the heat of the sun, and protecting them from the attacks of parasites and other enemies with admirable perseverance. I endeavoured to drive some from their posts by pricking them with the point of a black-lead pencil; but they refused to leave, seizing whatever was presented to them in their mandibles, no doubt very formidable weapons when employed against their race. They never attempted to use their wings or move from the spot."

*Trans. Ent. Soc., Lond., Vol. I., 1836, p. 232.

The genera are not numerous and may be separated as follows :

Table of Genera.

Hind wings with one closed submarginal cell.

Front wings with four submarginal cells.....3.

Front wings with three submarginal cells.....2.

2. First submarginal cell receiving both recurrent nervures ; antennæ 6-jointed.....Paraperga, Ashm., n. g.
(Type P. jucunda, Kirby.)

First and second submarginal cells each receiving a recurrent nervure ; antennæ 7-jointed..... Pseudoperga, Ashm., n. g.
(Type P. polita, Leach.)

3. Antennæ 6-jointed, joints 3 to 5 of an equal length or nearly so ; head subquadrate, scarcely so broad as the thorax ; first submarginal cell not unusually small.....Perga, Leach.

Antennæ 7-jointed ; head very large quadrate, fully as broad or a little broader than the thorax ; first submarginal cell very small, half the length of the second, or smaller.....Neoperga, Ashm., n. g.
(Type P. amenaida, Kirby.)

DIASPIS AMYGDALI IN MASSACHUSETTS

BY R. A. COOLEY, B. S., AMHERST, MASS.

In January of this year Mr. A. H. Kirkland sent me specimens of a scale insect he had taken from *Prunus mume* at the Arnold Arboretum, Jamaica Plain, Mass., which on examination proved to be *Diaspis amygdali*, Tryon. A little later Mr. Kirkland sent me more specimens which he had taken from *Prunus subhirtella* at the Arboretum. Specimens of the scale were sent to Dr. L. O. Howard, who confirmed my identification, stating also that he had asked Mr. Coquillett to examine the specimens and had received the report that he could find no difference between them and *Diaspis amygdali*. The infested trees came from Japan, the *Prunus mume* in the spring of 1894 and the *Prunus subhirtella* in the spring of 1897.

These specimens, with others of the same species received from various sources, have been compared with specimens of *Chionaspis prunicola*, Maskell, received from the author of the species, without finding the slightest difference. I therefore consider *Chionaspis prunicola* a synonym of *Diaspis amygdali*, which has priority.

ADDITIONS TO MY SYNOPSIS OF THE TACHINIDÆ.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Since the publication of the above work several additional forms have been examined, the result of which is recorded herewith. Dr. S. H. Scudder kindly presented to the National Museum co-types of his *Tachina theclarum*, and of many of the species described in his work on the Butterflies of New England; in every case these conform to the positions assigned them in my Synopsis.

Clistomorpha hyalomoides, Townsend, is a synonym of *Xysta didyma*, Loew. It belongs to the genus Clytiomyia, of which Clistomorpha is therefore a synonym.

Cistogaster pallasii, Townsend, Proc. Ent. Soc., Washington, 1891, page 142. This reference was inadvertently omitted in the Synopsis. I have not seen a specimen which agrees with this description.

Admontia hylotomæ, n. sp.—♂. Black, the palpi and apex of proboscis yellow. Front at narrowest part two-thirds as wide as either eye, no orbital bristles, frontals descending to middle of second antennal joint, antennæ five-sevenths length of face, the third joint nearly twice as long as the second, arista thickened on the basal third, the penultimate joint broader than long; sides of face at narrowest part each nearly one-half as wide as the median depression, bearing numerous bristly hairs, cheeks one-third as broad as the eye-height, vibrissæ slightly above the oral margin, ridges bristly on the lowest third. Thorax gray pruinose, marked with four black vittæ; three postsutural and three sternopleural macrochaetæ, scutellum bearing three pairs of long marginal and a short apical pair. Abdomen polished, last three segments gray pruinose at their bases, bearing discal and marginal macrochaetæ. Wings hyaline, slightly tinged with yellow along the veins, third vein bearing two or three bristles near the base; calypteres whitish. Hind tibiæ outwardly subciliate, front pulvilli as long as the last tarsal joint, tarsi not dilated.

♀ Differs from the ♂ as follows: Front as wide as either eye, two pairs of orbital bristles, third segment of abdomen carinate on the under side, the carina thickly beset with short spines; front pulvilli one-half as long as the last tarsal joint.

Length, 6 to 9 mm. Woods Holl, Mass. Bred from *Hylotoma humeralis*, Beauv., by Dr. Harrison G. Dyar. Three males and five females. Type No. 4061, U. S. Nat. Museum.

Admontia unispinosa, n. sp.— ♀. Differs from the ♀ of *hylotomæ* as follows: Apex of proboscis black. Front slightly wider than either eye, frontals descending only a short distance below base of second antennal joint, antennæ four-fifths as long as the face, the third joint from three to four times as long as the second, arista thickened on the basal half, sides of face each one-fifth as wide as the median depression, bearing a single row of bristly hairs, vibrissæ at the oral margin. Abdomen bearing only marginal macrochaetæ, destitute of spines on the under side. Wings not tinged with yellow along the veins, third vein bearing a single bristle near its base. Length, 4 to 6 mm. Opelousas, La. Eight specimens collected in June, 1897, by Mr. G. R. Pilate, and submitted by Dr. Garry de N. Hough. Type No. 4062, U. S. Nat. Museum.

Admontia tarsalis, n. sp.— ♀. Differs from ♀ of *hylotomæ* as follows: Apex of proboscis brown, basal half of antennæ yellow. Front one-fifth wider than either eye, antennæ as long as the face, the third joint five times as long as the second, sides of face each one-fifth as wide as the median depression, bearing a row of macrochaetæ in continuation of the frontal row, vibrissæ on a level with front edge of oral margin, ridges bristly on the lower half. Abdomen destitute of spines on under side. Front tarsi toward the apex greatly dilated. Length, 5 to 6 mm. Opelousas, La. Two specimens collected in May and June, 1897, by Mr. G. R. Pilate, and submitted by Dr. Garry de N. Hough. Type No. 4063, U. S. Nat. Museum.

Admontia polita, n. sp.— ♀. Differs from the description of *hylotomæ* ♀ as follows: Second joint of antennæ yellow, apex of proboscis brown. Frontal bristles descending only slightly below base of second antennal joint, antennæ almost as long as the face, the third joint three times as long as the second, sides of face each one-third as wide as the median depression, bearing a row of macrochaetæ, vibrissæ on a level with front edge of oral margin, only two or three bristles above each. Thorax polished, not pruinose except along the sides, scutellum destitute of a short apical pair of macrochaetæ. Abdomen not pruinose on the fourth segment, destitute of spines on the under side, discal macrochaetæ sometimes wanting. Length, 5 to 7 mm. Oswego, N. Y. (July 1 and 17, 1897; Prof. Chas. S. Sheldon), and Jacksonville, Fla. (Mrs. A. T. Slosson). Seven specimens.

Dionæa, Desv. (Synonym, *Labidigaster*, Macq.)—This genus falls

in the last couplet in my synoptic table, and will be recognized by having a single bristle at base of the third vein, the head one and one-third times as high as long, and the proboscis only once geniculate.

Dionæa nitoris, n. sp.— ♂ ♀. Black, the palpi yellow. Front of male one-fifth, in the female four-fifths, as wide as either eye, frontal bristles not descending beneath the base of second antennal joint, two pairs of orbital bristles in the female, wanting in the male, antennæ three-fourths as long as the face, the third joint one and one-half times as long as the second, arista thickened on the basal third; vibrissæ slightly above the level of the front edge of the oral margin, one or two bristles above each. Thorax polished, a median vitta in front of the suture and the lateral margins, whitish pruinose, three postsutural and two sternopleural macrochaetæ, scutellum bearing three long marginal pairs. Abdomen polished, without a trace of gray or whitish pruinosity, first segment one and one-half times as long as the third, the first three bearing only marginal macrochaetæ, last segment in the female provided at its apex with a pair of curved appendages resembling a pair of pincers. Tarsi not dilated, front pulvilli of male slightly longer than, in the female scarcely one-half as long as, the last tarsal joint. Wings gray, toward the base yellowish, along the posterior margin subhyaline, calypteres white. Length, 5 mm. Corvallis, Oregon. A specimen of each sex collected July 16 and Sept. 16, 1896, by Mr. A. B. Cordley. Type No. 4065, U. S. Nat. Museum.

Chætophleps rostrata, n. sp.— ♀. Black, the lower part of the face and apex of proboscis, yellow. Front slightly wider than either eye, two pairs of orbital bristles, frontals descending to middle of second antennal joint, antennæ nearly as long as the face, the third joint four times as long as the second, arista thickened almost to the middle, face in profile strongly concave, vibrissæ on a level with front edge of oral margin, two or three bristles above each, proboscis slender, the labella considerably prolonged backward. Thorax gray pruinose, marked with four black vittæ; three postsutural and two sternopleural macrochaetæ, scutellum bearing three marginal pairs. Abdomen polished, bases of last three segments gray pruinose, each segment bearing only marginal macrochaetæ, venter destitute of short, stout spines. Tarsi not dilated, hind tibiæ not ciliate. Wings hyaline, first vein bristly on its apical third, the third bearing three bristles near its base, calypteres white. Length, 3 mm. Biscayne Bay, Fla. (Mrs. A. T. Slosson), and Opelousas, La. (Mr. G. R. Pilate). Three specimens. Type No. 4066, U. S. Nat. Museum.

Hypostena setinervis, n. sp.— ♀. Black, the palpi, apex of proboscis, abdomen, coxæ, femora and tibiæ, yellow, the last two segments of the abdomen partly tinged with brown. Front as wide as either eye, two pairs of orbital bristles, frontals descending to apex of second antennal joint, antennæ as long as the face, the third joint six times as long as the second, arista thickened almost to the middle, vibrissæ on a level with front edge of oral margin, ridges bristly on the lowest fourth. Thorax gray pruinose, marked with four black vittæ; four postsutural and two sternopleural macrochaetæ, scutellum bearing three pairs of long marginal and a short apical pair. Abdomen polished, bases of last three segments whitish pruinose, first three segments bearing only marginal macrochaetæ, venter destitute of short, stout spines. Tarsi not dilated, hind tibiæ subciliate. Wings hyaline, third vein bristly to slightly beyond the small cross-vein, hind cross-vein nearer to the small than to bend of fourth vein, calypteres white. Length, 5 mm. Biscayne Bay, Florida. A single specimen collected by Mrs. A.T.Slosson. Type No. 4067, U. S. Nat. Museum.

Exorista dorsalis, n. sp.— ♀. Black, the palpi and sometimes the sides of the abdomen, except at each end, yellow. Front from three-fifths to two-thirds as wide as either eye, two pairs of orbital bristles, frontals descending to apex of second antennal joint, sides of face and of front in front of the orbitals silvery-white pruinose, antennæ nearly as long as face, the third joint from three to four times as long as the second, arista thickened on the basal two-fifths, the penultimate joint only slightly longer than broad, facial ridges bristly on the lowest two-fifths, cheeks one-sixth as broad as the eye-height. Thorax polished, having a strong brassy tinge, without a trace of light coloured pruinosity on the dorsum; three postsutural and three sternopleural macrochaetæ, scutellum bearing three pairs of long marginal and a short apical pair. Abdomen somewhat polished, thinly gray pruinose, last three segments bearing discal as well as marginal macrochaetæ. Hind tibiæ outwardly ciliate, middle tibiæ each bearing a single macrochaeta on the front side near the middle. Wings hyaline, third vein bearing from two to four bristles near its base, bend of fourth vein destitute of an appendage, calypteres whitish. Length, 6 to 7 mm. North Mt., Pa. (Sept. 2, 1897; Mr. C. W. Johnson), and Ga. Two specimens. Type No. 4068, U. S. Nat. Museum.

Brachycoma Sheldoni, n. sp — ♂ ♀. Black, a subtriangular spot outside of each vibrissa, brown, a yellow ring on the arista beyond the thickened base. Front of male one-fourth as wide as in the female, as wide as

either eye, two pairs of orbital bristles in the female wanting in the male, frontals descending almost to base of second antennal joint, sides of face bearing bristly hairs, and on the lower portion with several macrochaetæ, antennæ from slightly over two-thirds to three-fourths as long as the face, the third joint only slightly longer than the second, arista long pubescent on basal half, thickened on the basal fifth, vibrissæ on a level with front edge of oral margin, two or three bristles above each, cheeks three-fifths as broad as the eye-height. Thorax gray pruinose, marked with three black vittæ; three postsutural and three sternopleural macrochaetæ, scutellum bearing three long marginal pairs. Abdomen somewhat polished, gray pruinose and with darker reflecting spots, last three segments bearing only marginal macrochaetæ. Middle tibiæ each bearing two or three macrochaetæ on the front side near its middle, front pulvilli of male as long as the last tarsal joint. Wings hyaline, tinged with yellow at the base, costal spine longer than the small cross-vein, third vein bristly at least half-way to the small cross-vein, calypteres white. Length, 8 to 10 mm. Oswego, N. Y. One male and three females collected in July and August, 1895 and 1896, by Prof. Charles S. Sheldon, after whom the species is named. Type No. 4069, U. S. Nat. Museum.

ON SOME SMALL BEES FROM ARIZONA.

BY T. D. A. COCKERELL, MESILLA, N. M.

Some time ago Prof. C. F. Baker sent me a lot of small bees collected by Dr. R. E. Kunzé at Phœnix, Arizona, May 12, 1897, "on willows and various low herbs." I have examined these with interest, as they belong to genera not recorded from that region; they prove to be as follows:

(1.) *Perdita salicis*, Ckll., 1896.—♂. ♀. Very many specimens.

(2.) *Prosapis mesillæ*, Ckll., 1896.—A few, mostly males.

(3.) *Halictus meliloti*, Ckll., 1895.—One ♀.

(4.) *Halictus pseudotegularis*, Ckll., 1896.—On April 12, 1897, I took at flowers of *Sisymbrium*, in Mesilla, N. M., a single *Halictus* which differed decidedly from Illinois *H. tegularis*, but, to my surprise, almost agreed with the Mexican *H. pseudotegularis*, except that the wings were clear. Now, among the Arizona bees I find examples of *pseudotegularis* with slightly dusky wings, as in the type of that species; the second submarginal cell is noticeably smaller than in *tegularis*, and receives the recurrent nervure further from its end.

(5.) *Halictus Kunzei*, n. sp.— ♀. Length hardly 5 mm.; head and thorax shining olive green, abdomen ferruginous, the apical two-fifths blackish. Head rather large, considerably broader than thorax, finely and rather closely punctured, facial quadrangle nearly as broad as long; face with only a few scattered hairs on its lower part; flagellum ferruginous beneath, except at base; clypeus with its apex darkened, its disc smooth, with only a few scattered punctures; mandibles ferruginous except at base; thorax almost entirely nude. Short white hairs on hind part of metathorax and lower part of pleura; mesothorax and scutellum very shiny, punctured at the sides, the punctures becoming scattered centrad, leaving the disc smooth, nearly impunctate; basal enclosure of metathorax semilunar, with fairly strong rugæ; pleura well punctured; tegulæ testaceous; wings hyaline, faintly yellowish, subcostal nervure black, other nervures and stigma honey-colour; third submarginal cell bulging outwardly, narrowed much less than one-half to marginal; legs piceous, with thin white pubescence, knees and tarsi somewhat paler and more ferruginous; spurs pallid, hind spur of hind tibiæ with large teeth; abdomen of the usual form, shining, impunctate, naked, with a very little pubescence at the end; ventral surface ferruginous, with very little hair. The cheeks are broad, but not produced below. One ♀. Known from the few species of similar coloration by the smooth, not granular, mesothorax, etc. It is perhaps nearest to *H. impurus*, Cr., but differs by the scanty pubescence of face, colour of nervures, etc.

(6.) *Ceratina arizonensis*, n. sp.— ♂. Length about 3½ mm., shining black; face narrow, entirely ivory white up to level of antennæ, except the supraclypeal area, which is black; lateral sutures of clypeus marked by a black line; anterior edge of clypeus with a dark spot on each side; labrum ivory-colour, with a dark spot on each side; mandibles black, ferruginous towards ends, but dark at tip; vertex smooth and impunctate, occiput with strong, large punctures; cheeks smooth and impunctate, except quite posteriorly; flagellum brown; mesothorax punctured in front and along hind margin, centrally impunctate; scutellum punctured; base of metathorax minutely striate-granular, more or less tessellate; tarsi pale ferruginous, anterior tarsi more or less white in front; anterior tibiæ white in front, brownish-ferruginous behind; anterior femora black, apex and a stripe beneath for the apical two-thirds, white; four hind knees white, the white continued as a stripe on the tibiæ; tubercles white; wings rather dull hyaline, strongly iridescent,

nervures and stigma piceous or dark brown; abdomen punctate, apex broadly truncate, the truncation slightly concave.

Several specimens. This species does not resemble any of those described from North America. In its black colour, and the truncate apex of the abdomen, it resembles the European *C. cucurbitina*, Rossi. In the pale face it resembles *C. Marawitzii*, Sickm., and *C. flavipes*, Sm., from China. It is therefore a species of unusual interest.

A NEW SQUASH BUG.

BY F. H. CHITTENDEN, WASHINGTON, D. C.

In the course of an investigation of insects affecting cucurbits, begun in a preliminary way in the season of 1897, as a part of the official work of the Division of Entomology of the Department of Agriculture, it was found that we have in addition to the common squash bug, *Anasa tristis*, DeG., a second species sufficiently resembling it as to have readily escaped the notice of the average observer, but at the same time quite distinct in all its stages. This species is *Anasa armigera*, Say, and it was first observed on cucurbits by the writer July 12, near Colonial Beach, Va., where it occurred on cucumbers. Afterward it was taken by the writer and Mr. F. C. Pratt, of the Division of Entomology, who has assisted in field investigations and collections on different cucurbits, at Ballston, Va., Poolesville and Seat Pleasant, Md., and on the Conduit Road and at Tenleytown, D. C. At the last mentioned place it occurred in great abundance on a late crop of cucumbers and watermelons. As late as the 29th of September, all stages of the insect were found, including the egg. The present year the species was found to be nearly as abundant in some localities as the common squash bug. Such was the case at Marshall Hall, Md., and in one locality in the District of Columbia. It was also observed on squash at College Station and Kensington, Md., and on cucumber at Cabin John, Md.

Anasa armigera appears to have very much the same habits as its more common congener, preferring squash of all cultivated plants, but feeding on canteloupe and other curcurbits when squash is not available. It is noticeably more active than *tristis*, flying freely in the hot sunshine and exposing itself on the upper surface of the leaves in midday. It also has a later season, appearing three weeks later, according to recent observations, and remaining in the field after the common species has gone into hibernation. Evidently it is a southern form, and perhaps has

not till recently been present in such numbers as we now know it to be in and about the District of Columbia. It has not, to my knowledge, been taken in this neighbourhood prior to 1884, when a single individual was captured by Mr. Otto Heidemann, in the District of Columbia. Now it is present here wherever curcurbits are grown, and it has come to stay if the last two seasons are a criterion. A number of these bugs were placed on a squash plant on the Department grounds the 1st of October, 1897, and the following July several were collected there that had very evidently survived the winter from this lot, as there is little possibility that they flew in from some outside source.

The species has been sent in through correspondents of the Department but once. August 5, 1898, specimens were received from Mr. H. J. Gerling, with report that they were taken on cucumber at St. Charles, Mo.

For the identification of this species, it should be said that it is of nearly the same size as *tristis*, but may be easily distinguished by its broader prothorax and more prominent angles, the reflected sides of the abdomen, showing four prominent white marks on the hemelytra, and its armed femora, whence is derived its specific name. The upper surface is brown, the legs and first joints of the antennæ whitish, spotted and irrorated with black. In front of each eye is an acute porrect spine.

The egg is of nearly the same size and proportions as that of *tristis*, but it is much lighter in colour, being light golden bronze instead of dark bronzy brown, the normal colour of the latter. In its active stages, however, it is quite distinct, being lighter in colour, with the legs ornamented by alternate bands of red or black and white.

It is impossible at present to define the exact economic status of this species. Certainly it is not a first-class pest in its northern range, and, from its observed later appearance, hardly likely to become so. It is capable, however, of injuring late crops of all the curcurbits.

In addition to the localities mentioned, the species is known from Kansas, Western Iowa, and Florida.

It is hoped that the readers of this publication who have opportunity of observing curcurbit insects will keep a lookout for this squash bug, and send specimens, if they are successful in securing them, that we may be able to identify the species and thus learn more of its distribution. Specimens will be returned if desired.

NEW SPECIES OF NORTH AMERICAN MYRMELIONIDÆ.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

III.

BRACHYNEMURUS HUBBARDII, new species.

Male.—Length, 46 mm.; expanse of wings, 49.5 mm.; greatest width of anterior wing, 6 mm.; length of antenna, 9 mm. Very slender; yellow, marked with dark fuscous; sparsely hairy, more thickly on abdomen.

Face scarcely convex, yellowish; above, a broad pitchy-black band, notched in middle below, extending around the antennæ on outer side; a faint fuscous line extends from centre of notch almost to clypeus; furrow between face and inner orbit of the eye, fuscous. Circumocular area yellowish, except along depressed portion of the vertex, where it is dark fuscous, and below, near maxillary palpiger, where there is a black spot. Clypeus yellowish, with a few coarse black hairs. Labrum transverse, rounded laterally and narrowed anteriorly, somewhat emarginate in front, yellowish, slightly tinged with rufous, several coarse dark hairs on anterior border. Mandibles piceous, black at tips; on inner edge, near apex, a tooth.

Maxillary palpi yellowish, slightly tinged with rufous apically; first two joints short, subequal, about as broad as long; third joint somewhat longer than first two together, perceptibly curved, enlarged apically; fourth joint straight, a little shorter than third; last joint somewhat longer than third, subcylindrical, truncate at tip, and slightly notched.

Labial palpi about same length as maxillary, yellowish; first joint not quite twice as long as broad, enlarged apically; second joint more than twice as long as first, slightly curved, strongly widened and thickened apically; third joint about same length as second, fusiform, faintly hairy, tinged with rufous around ocelloid spot and on tip; the latter fine, truncate, slightly notched.

Maxillary palpigers yellowish, with some dark fuscous spots. Labium, labial palpigers, mentum and gula yellowish, the latter clouded with fuscous; the mentum bears a long, coarse, black bristle and a few black hairs.

Antennæ clavate, longer than head and thorax; fuscous, articulations yellowish, more distinctly so on basal joints; clothed with very short,

stiff hairs; first and second antennal joints piceous, yellowish at bases and apices; a yellowish crescent bounds base of first joint in front. Between the antennæ posteriorly, a narrow transverse yellowish band.

Vertex elevated behind, rounded, yellowish; in front, on depressed portion and anterior part of elevated portion, dark fuscous; longitudinal median furrow and an irregular spot each side, behind, dark fuscous.

Pronotum as broad as long at base, somewhat narrowed anteriorly, yellowish; anterior angles rounded, front margin slightly emarginate; four longitudinal dark fuscous lines.* Lateral carinæ yellowish. Below yellowish; on each side, at base of anterior legs, a dark fuscous spot, produced anteriorly along the carina.

Mesonotum yellowish; lobes moderately elevated, marked similarly to those of *B. 4-punctatus*.† Sides and beneath yellowish, marked with fuscous.

Metanotum yellowish, lobes less elevated than those of mesonotum; marked much as those of *B. 4-punctatus*; the two longitudinal lines which unite to form the "U" and heart-shaped markings in the latter, however, approach medially, but do not meet, in this species, giving the appearance of a letter "X" when viewed from a distance. Sides and beneath yellowish, marked with fuscous.

Abdomen longer than wings, yellowish, a fuscous stripe each side, on dorsum and venter; the dorsal stripe is separated from the ventral by the lateral suture only; a longitudinal median fuscous stripe on venter on basal segments. A longitudinal median fuscous line, also, on dorsum of apical segments. All markings of apical segments more extended so as to make these segments almost entirely fuscous.

Tip of abdomen luteous, clouded with fuscous; clothed with long dark hairs; appendages one-half the length of seventh segment, slender, somewhat flattened laterally, divergent on apical half; luteous, clouded with fuscous, clothed with coarse black bristles; between the appendages below, a short triangular fuscous plate.‡

Legs short and slender, yellowish, beset with numerous black hairs

*On the female specimen, the outer lines are nearly interrupted at the transverse furrow.

†Can. Ent., XXX., 5, 1898, p. 138. These markings seem to be, in a rough way, continuations of the four longitudinal lines of the pronotum.

‡This seems to be the ventral projection of the short eighth segment.

and some coarse black spines (most of which latter are black, the rest luteous); tibiæ each with a transverse piceous line on outer side near base; sometimes clouded with piceous at articulations with femora; ringed with piceous at their apices. Tibial spurs as long as first two tarsal joints, in anterior and middle legs (in posterior, somewhat shorter); slightly curved, rufo-piceous. Tarsal joints piceous at their apices; claws considerably more than half the length of last tarsal joint, moderately curved, rufo-piceous.

Wings of moderate size, hyaline, the posterior margins sinuate apically; venation hairy. Pterostigma small, luteous, reaching forward only half way to the costal margin. Intercostals in apical half of anterior wings forked, a somewhat less number forked in posterior wings. Veins luteous, interrupted, principally at junctures with other veins, with fuscous.

Anterior wings with series of small fuscous spots or cloudings, principally along anterior side of submedian vein and posterior side of the first longitudinal vein above it; a few spots and cloudings also at tip of submedian vein, at bases of smaller forks, and along veins near posterior border; posterior wings quite a little shorter than anterior, immaculate. Posterior borders of both wings fringed with fine hairs.

Female.—Length, 28 mm.; expanse of wings, 49.5 mm.; greatest width of anterior wing, 6.3 mm.; length of antenna, 6 mm.

Antennæ more clavate than in male. Abdomen a little shorter than wings; marked similarly to that of the male, but the mid-dorsal stripe exists on all the segments, while the mid-ventral stripe of basal segments is absent. Tip of abdomen luteous, clothed above with long black hairs; superior parts split; inferior part beset with coarse, blunt, black spines; below, two small cylindrical luteous appendages, three times as long as broad, with some very long, black hairs or bristles. Anterior wings almost immaculate, a few very small faint cloudings along submedian and post-costal veins.

Type.—No. 4070, U. S. National Museum. One male specimen collected at Fort Grant, Arizona, July 22, 1897, by Mr. Henry G. Hubbard.

No. 4070 a, U. S. National Museum. One female, with same locality and date, collected by Mr. Hubbard.

A handsome little species, resembling somewhat, in general appearance, *B. abdominalis* (Say).

NEW COCCIDÆ.

BY EDW. M. EHRHORN, MOUNTAIN VIEW, CAL.

Eriococcus adenostomæ, n. sp.

♀ enclosed in an oval (at one end more or less pointed) sac about 3 mm. long and 1½ mm. broad, woolly, snow-white, of uniform texture.

♀ oval, about half again as long as broad, dark purple, turning bright crimson when placed in K. H. O. Body about 1½ mm. long. Antennæ light brown, 7-jointed, formula: approximately (347) (12) 56, joint 3 equal 5 + 6. Most of the joints with hairs; joint 7 with several comparatively long hairs.

Legs light brown, large and stout. Each joint with one or more bristles. Femur quite swollen. Tarsus a trifle longer than tibia. Claw stout and curved. Both tarsus and claw with long filiform digitules.

Posterior tubercles short and rounded, with one very long, stout bristle and two shorter ones on their outer margin. Anal ring large, with eight long bristles. Derm colourless, with quantities of small spines and rounded glands distributed all over the dorsum.

Sac of ♂ smaller and narrower than that of the ♀, colour more creamy.

Hab.—On *Adenostoma fasciculatum*, in the mountains, near Mountain View, Cal.

Lecanium pubescens, n. sp.

♀ scale about 4 mm. long, 2½ broad, and 2 mm. high, moderately soft, before gestation covered with very soft hair. Colour blackish-brown, more on the black, with a yellow longitudinal band on the dorsum. Dorsum pitted and margin slightly wrinkled. Some specimens show a lighter colour. When removed from twig the insect leaves a small amount of white powder.

Derm by transmitted light colourless, except margin, which is light brown, with numerous small round gland pores. Margin with a double row of minute simple spines, lateral incisions with one moderately stout spine and two short ones. Anal plates large, outer corner forming a right angle, with several hairs at tip and a long, stout hair on each plate. Anogenital ring with six long, stout hairs. Legs slender. Tibia and tarsus about equal. Femur a little longer than tibia. Coxa, trochanter and femur each with a hair. Claw curved, with slender

knobbed digitules. Tarsal digitules with very fine, long, knobbed hairs. Antennæ 7-jointed, formula : 43 (12) 7 (56). Joint 4 very little longer than 3. Joint, 1, 2, 4, 6 each with a hair; joint 7 with several hairs.

♂ scale glassy white with median ridge, about 1½ mm. long.

♂ body dark red-brown, legs and antennæ light brown. Wings extend ⅓ beyond body, colour iridescent. Thorax with two elevated ridges much darker than body. Antennæ very hairy.

Hab.—On *Quercus sp.*, in the mountains, near Mountain View, Cal.

Lecanium Crawii, n. sp.

♀ scales not crowding each other; hemispherical, about 3 mm. long, 2 mm. broad and 1½ mm. high, oval, shiny, brown, getting darker with age. Margin generally lighter than dorsum.

♀ before gestation light brown, shiny. Derm, by transmitted light, brown, with numerous oval gland orifices. Marginal hairs very short and slender. Lateral incisions each with three stout but not long spines. Antennæ 7-jointed, 3 longest, twice as long as 4. Joints 5 and 6 very short. Joints 1 and 2 about equal. Formula : 347 (12) 56. Anal plates broad but not very large. Anogenital ring with six moderately slender hairs. Legs quite stout. Coxa and femur with stout hair. Femur very little longer than tibia. Tibia and tarsus about equally long. Claw stout and curved. Tarsal digitules moderately stout, knobbed hairs. Digitules of claw not stout, a little longer than claw, more or less club-shaped.

Larva light yellow, with distinct ridge on dorsum dividing scale lengthwise. Oval, about twice as long as broad. Rostral loop extending to third pair of legs.

Hab.—On *Acer macrophyllum*, in the mountains, near Mountain View, Cal.

Comys fusca was reared from this species.

Lecanium ventrale, n. sp.

♀ scale about 4½ mm. long, 3 mm. broad, 1 mm. high. Oval when seen from above. Soft texture, very much like *L. hesperidum;* light brown, not very convex, and a dark brown border near margin. Dorsum pitted and margin moderately wrinkled, an indistinct mesial ridge.

♀ colour greenish-yellow, with a brown longitudinal line on the dorsum, also two brown lines forming a double cross with the dorsal line, more or less wrinkled and pitted. Ventral view shows the abdomen

a dark purple-brown with very distinct segmentation. Viviparous.

After boiling in soda, derm colourless. Margin with small curved spines. Lateral incisions with long, stout, curved spine and two shorter ones. Anal plates large, with blunt tips, bearing several hairs and notched on outer margin, together forming a square. Each plate has a distinct brown projection into the body. Anogenital ring with six hairs, which are very long, extending ⅔ over the plates. Legs stout, coxa and femur each with a stout hair. Femur ⅓ longer than tibia. Tarsal digitules long, knobbed hairs, digitules of claw broad and thick. Claw stout and curved. Antennæ 7-jointed, formula: 34721 (56). Joints 1 and 2 with two hairs each. Joints 4, 5, 6 and 7 with several hairs. Joint 3 very little longer than 4. Joints 5 and 6 equal. Larva lemon-yellow, very flat, shiny, oval, about twice as long as broad.

Hab.—On *tuberous plant* in Japanese Nursery, at San José, Cal.

Encyrtus flavus and *Coccophagus lecanii* were reared from this species.

Supplementary Note, and Notice of a New Eriococcus.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Mr. Ehrhorn has been so kind as to send me examples of all his new species above described, and I have also been allowed to examine his type slides. The following remarks are offered as a result of the examination of this material. The measurements of antennæ and legs given are all in thousandths of a millimetre:

Eriococcus adenostomæ, Ehrh.—This is a distinct little species, with a pure white sac.

The following measurements will help to separate several of our species of *Eriococcus*:

Antennæ of adult female: Segments—	1	2	3	4	5	6	7	Formula.
E. adenostomæ, Ehrh.....	?	25.	33.	25.	16.	16.	31.	37(24)(56).
E. neglectus, Ckll.....	?	16.	33.	11.	14.	25.	..	36254.
E. quercus, Comst	?	47.	53.	50.	22.	25.	42.	342765.
E. Tinsleyi, Ckll., n. sp. (*a*)....	?	31.	45.	45.	25.	19.	25.	(34)2(57)6.
" " " (*b*)....	?	28.	101.	16.	14.	28.	..	3(26)45.

Of course there is considerable variation, and these figures merely represent average specimens selected. The first segment is more or less ringlike, and its length could not be well measured.

Anterior leg of adult female:	Tibia.	Tarsus (excl. claw).	Claw.
E. adenostomæ, Ehrh.....	84.	90.	28.
E. neglectus, Ckll.....	62.	76.	22.
E. quercus, Comst..... ..	155.	76.	28.
E. Tinsleyi, Ckll., n. sp.	98.	107.	33.

In *adenostomæ* the femur is very stout; length 118, breadth 64.

The *E. quercus* studied was found by Mr. Quaintance on *Quercus aquatica*, at Lake City, Florida, Jan. 12.

Eriococcus Tinsleyi, Ckll., n. sp., was found by Prof. J. D. Tinsley, April 30th, 1898, on roots of *Atriplex canescens*, close to the Agricultural College at Mesilla Park, New Mexico. The sac is 4 mm. long, of the ordinary form and texture of the genus; yellowish-white. Female removed from ovisac plump, 3 mm. long, nearly 2 broad, not tapering behind, delicately and very thinly pubescent, pale brown with a purple tinge, two purplish dorsal bands faintly indicated. Legs and antennæ light brown. Antennæ sometimes with 6, sometimes with 7, segments, as above. The ♀, placed in K. H. O., immediately turns brilliant crimson.

Larva pale sage green, naked. Immature ♀ purplish-gray, quite bristly with white filaments, or it may be better to say, thinly but conspicuously beset with short white bristles. Eggs pale lemon yellow. Allied to *E. dubius*, Ckll.

Lecanium pubescens, Ehrhorn, is a *Eulecanium* related to *L. quercifex*, Fitch, but differing in the smaller size, and the details of the legs and antennæ. Under a high power the skin is seen to be minutely tessellate, in the manner usual in the subgenus.

L. Crawii, Ehrh., is also a *Eulecanium*. It has a good deal of superficial resemblance to *L. nigrofasciatum*, Pergande, ined., being of about the same size and shape, though of a different colour.

L. ventrale, Ehrh., is related to *L. acuminatum*, Sign., but differs in the longer tarsus.

The following tables will assist in the recognition of these species:

Antennæ of adult female: Segments—	1	2	3	4	5	6	7	Formula.
L. pubescens.....	45.	45.	64.	73.	33.	28.	47.	437(12)56.
L. Crawii .....25.	31.	53.	67.	19.	16.	33.	4372156.	
L. ventrale .....28.	39.	64.	73.	22.	25.	45.	4372165.	

Anterior leg of adult female:	Tibia.	Tarsus (excl. claw).	Claw.
L. pubescens.....	118.	84.	19.
L. Crawii.....	95.	70	..
L. ventrale	104.	73.	16.

CORRESPONDENCE.

FOOD PLANT OF EUPHANESSA MENDICA.

On page 227, Vol. III., CANADIAN ENTOMOLOGIST, I find note of Mr. Saunders's unsuccessful endeavours to find the food plant of this species, and no record of the food plant is contained in Bulletin No. 35 of the United States National Museum, "Bibliographical Catalogue of the Described Transformations of North American Lepidoptera," by Henry Edwards. I offer the following information upon this matter: While picking the common violet, something dropped from one of the leaves, and as the leaf was considerably eaten I at once made careful search. I found a larva in the form of an eye (such as is used by dressmakers) among and hardly distinguishable from dried grasses and twigs, except by its peculiar form. I gathered nine or ten of these, in different stages, and reared them to maturity. The larva, so far as I can remember, having made no notes, varies very little in form or colour in any of its stages. The larvæ are very easily reared. The chrysalis is formed between twigs or leaves knit together by several silken threads, in which state it remains about ten days. FRANK LUCOCK, Pittsburg, Pa.

DR. O. HOFMANN, Über die Anordnung der borstentragenden Warzen bei der Raupen der Pterophoriden.

Prof. Grote has kindly sent me a copy of this article by Dr. Hofmann, published in the "Illustrierte Zeitschrift für Entomologie." Dr. Hofmann gives figures showing the arrangement of the warts in the larvæ of certain Pterophoridæ. He shows that the setæ may vary from single to multiple, that tubercles i. and ii. may be separate or united and that iv. and v. may be separate (fig. 7). On the basis of this variation, he criticises the value of the larval characters in classification, saying, "After we have seen how many modifications the normal type of wart formation may undergo in the small, well-limited family Pterophoridæ, which is evidently a natural family, we cannot give the same high systematic value to it as Dyar does," etc. Dr. Hofmann has encountered an extreme case; but it does not invalidate my larval classification, as he seems to think. I have not contended that family characters were strongly marked in the larvæ, though they are often well indicated. My contention has been for the superfamily groups, and these are not in any way invalidated by Dr. Hofmann's facts, as a reference to my definitions will show.

HARRISON G. DYAR.

Mailed September 12th, 1898.

The Canadian Entomologist.

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CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 5.)

FAMILY IX.—SELANDRIIDÆ.

After the removal of the *Strongylogasterinæ*, which, to a certain extent, form a connecting link between this family and the Tenthredinidæ, but which, on account of their elongate shape and their cephalic and abdominal characteristics, I have placed with the latter family rather than retain here, there need be no difficulty in separating the *Selandriidæ* from all the other families by the characters made use of in my table.

The species have a peculiar *habitus* quite their own, and with a little care one may easily recognize a Selandriid without even the trouble of an examination.

The head is more transverse, the temples much narrower, not nearly so quadrate as in the Strongylogasterinæ; the antennæ are shorter, the scape or first joint not or rarely much longer than the pedicel or second joint; the wings are proportionately shorter and broader, the costal vein being much dilated or broadened towards the apex, before the stigma; while the abdomen is much shorter, broader and oviform.

I have separated the family into four subfamilies, distinguished as follows:

Table of Subfamilies.

Lanceolate cell petiolate (in only a single genus *Kaliosysphinga* = Pseudodineura, Konow, does it appear contracted, but in this genus the anal vein is faint or sub-obsolete before uniting with the submedian vein, while the anal cell in the hind wing is wanting)...Subfamily I., Blennocampinæ.

Lanceolate cell contracted before the middle, but still open, and sometimes with an oblique or transverse nervure between it and the apex.

Antennæ 4-jointed, the third joint very long, the fourth or last very minute .....Subfamily II., Blasticotominæ.

Antennæ 7-15-jointed (in a single case 22-jointed), the third joint not unusually long, often shorter or not longer than the fourth ..... Subfamily III., Selandriinæ.

Lanceolate cell contracted at or a little before the middle, and completely closed ..... Subfamily IV., Hoplocampinæ.

Subfamily I.—Blennocampinæ.

The distinctly petiolated lanceolate cell in the front wings readily distinguishes this group. The anal vein is usually entirely wanting; in only two or three genera is it present, and with these genera some difficulty might arise in placing, since this vein curves upwards towards the submedian, and thus resembles somewhat the contracted lanceolate cell of the *Hoplocampinæ*. The vein, however, does not quite attain the submedian, and there is always a distinct space between them.

Table of Genera.

Front wings with four submarginal cells ..... 4.

Front wings with three submarginal cells, the first transverse cubitus wanting, rarely with the second transverse cubitus wanting.

Hind wings with two discal cells ..... 3.

Hind wings without discal cells ..... 2.

2. Antennæ 11-14-jointed ..... Fenella, Westw.

Antennæ 9-jointed.

Hind wings with a distinct anal cell ..... Fenusa, Leach.

Hind wings without an anal cell ..... Kaliosysphinga, Tischb. (= Pseudodineura, Konow.)

3. Front wings with the second transverse cubitus wanting; head transverse; clypeus anteriorly truncate ..... Pelmatopus, Hartig.

Front wings with the first transverse cubitus wanting; head large, quadrate, the temples broad; clypeus anteriorly deeply emarginate; antennæ densely hairy, the third joint nearly as long as joints 4–5 united ..... Xenapates, Cameron.

4. Second recurrent nervure joining the third submarginal cell ..... 5.

5. Eyes extending to base of mandibles or at most with only a linear space between ..... 10.

Eyes more or less distant from base of mandibles, with a distinct space between ..... 6.

6. Hind wings not surrounded by a bordering nervure at apex ..... 7.

Hind wings surrounded by a bordering nervure at apex.

No discal cell in hind wings; claws bifid or with a tooth within.

Anal cell in hind wings shorter than the submedian, petiolate or subpetiolate. ♂ ..... Periclista, Konow.

Anal cell in hind wings fully as long as the submedian. ♂ ..... Isodyctium, Ashm.

7. Hind wings without a closed discal cell. ..... 9.

Hind wings with a closed discal cell.

Claws simple, or with a very minute, scarcely perceptible tooth within ..... 8.

Claws cleft, or with a large tooth within.

Anal cell in hind wings shorter than the submedian cell.

Transverse median nervure in hind wings received by the discal cell at or somewhat *beyond* the middle; sheaths of ovipositor equally thickened and more or less obliquely pointed at apex; third joint of antennæ almost as long as joints 4–5 united. ♀ ..... Periclista, Konow.

Transverse median nervure in hind wings received by the discal cell *before* the middle; sheaths of ovipositor produced at apex into a thorn-like tip. ♀ ..... Ardis, Konow.

Anal cell in hind wings as long as the submedian. ♀ ..... Isodyctium, Ashm.

8. Third joint of antennæ longer than the fourth; sheaths of ovipositor at tips obtuse ..... Pareophora, Konow.

Third joint of antennæ a little shorter than the fourth, never longer; sheaths of ovipositor at tips rounded; clypeus anteriorly truncate ..... Rhadinoceræa, Konow.

9. Anal cell in hind wings as long as the submedian. ♀ ..... Isodyctium, Ashm.

Anal cell in hind wings shorter than the submedian. ♂ ..... Ardis, Konow.

10. Præsternum of mesosternum not at all separated by a suture .... 11.

Præsternum of mososternum separated by a distinct suture; clypeus anteriorly truncate; hind wings with one discal cell, the anal cell shorter than the submedian; claws long, simple ..... Tomostethus, Thomson.

11. Hind wings with one discal cell ..... 15.

Hind wings without a discal cell.

Hind wings with the marginal cell pointed at apex, and sometimes open..... .....14.

Hind wings with the marginal cell well rounded at apex, *without* an appendage ; *a surrounding nervure at apex*..... 13.

Hind wings with the marginal cell well rounded at apex, but *with* an appendage ; *no surrounding nervure at apex*....12.

12. Third transverse cubitus curved inwardly, not extending in the same direction with the transverse radius, the third submarginal cell considerably larger than the first and second united ; antennæ densely pilose, tapering towards tips, the third joint longer than the fourth ; claws cleft. ♀ ♂ .. ..Parazarca, Ashm.

Third transverse cubitus straight, or nearly so, running in the same direction with the transverse radius ; antennæ pubescent, the third joint nearly as long as joints 4–5 united.

Claws cleft or bifid ; anal vein in front wings straight, not curving upwards at tip ; transverse cubitus in hind wings not short, the anal cell somewhat briefly petiolate.

♀.....Erythraspides, Ashm.

Claws simple ; anal vein in front wings curving upwards at tip ; transverse cubitus in hind wings very short, the anal cell longly petiolate. ♀ ♂ .....Blennacampa, Hartig.

13. Third transverse cubitus curved inwardly, not extending in the same direction with the transverse radius, divergent ; third submarginal cell larger than the first and second united ; pedicel as long as the scape, about thrice as long as thick at apex.

♂ .....Calozarca, Ashm.

Third transverse cubitus straight, or nearly so, and running in the same direction with the transverse radius ; third submarginal cell hardly larger than the second, much smaller than the first and second united ; pedicel shorter than the scape, only a little longer than thick. ♂ .....Erythraspides, Ashm.

14. Third transverse cubitus in front wings not running in the same direction with the transverse radius ; marginal cell in hind wings *with* an appendage ; third joint of antennæ much shorter than joints 4–5 united ; claws with a small tooth within.....Scolioneura, Konow.

Third transverse cubitus almost interstitial with the transverse radius and having the same direction ; marginal cell in hind wings

without an appendage, sometimes open at apex; claws with a strong tooth at base.....Entodecta, Konow.

15. Hind tarsi usually longer than their tibiæ; clypeus very small, transverse linear; antennæ densely pilose, the third joint longer than the fourth; anal cell in hind wings a little shorter than the submedian. ♀ ♂.....Zarca, Cameron.

Hind tarsi not longer than their tibiæ; clypeus not unusually small, anteriorly subemarginate or truncate.

Antennæ pubescent, the third joint distinctly longer than either the fourth or fifth.

Third submarginal cell longer than 1–2 united; antennæ densely pilose, tapering off toward tips, the third joint about as long as 6–9 united..... Calozarca, Ashm.

Third submarginal cell not longer than 1–2 united; antennæ pubescent, the third joint not longer than 4–5 united.

Claws cleft; transverse radius and the third transverse cubitus running in the same direction; larvæ with forked spines.....Monophadnoides, Ashm., n. g.
(Type M. rubi, Harris.)

Claws simple, or with a minute tooth near the middle; transverse radius and the third transverse cubitus *not* running in the same direction, divergent; larvæ smooth.....Monophadnus, Hartig.
(Type T. albipes, Gmel.)

Antennæ clothed with long appressed hairs, the third and fourths joints equal, the fifth longer, all somewhat thickened toward tips.....Senoclia, Cameron.

Subfamily II.—Blasticotominæ.

This group is confined to Europe, and is represented by a single genus, with one species, the *Blasticotoma filiceti*, Klug. The species in some of its characters, especially in the antennæ, is quite anomalous. It has been shifted from one place to another by different authorities, but to me seems to belong to the Selandriidæ. The shape, especially of the head and thorax, agrees quite closely with such genera as *Rhadinocerœa*, *Phymatocera* and *Tomostethus*, while the venation agrees fairly well with many other of the Selandriidæ, the only real difference being in the more distinctly petiolated first discoidal cell, caused by the cubitus originating farther away from the apex of the basal nervure than is

usual. The first discoidal cell in *Athalia annulata* is, however, similarly petiolated. The antennæ alone, therefore, offer any very striking difference: They are four-jointed, the third joint being very long, the fourth or last very minute. At first sight they appear wholly different from other sawflies, and I was almost inclined to consider them of family value, as I have the three-jointed antennæ in the Hylotomidæ; but on submitting them to a high-power lens I was able to see that the long third joint was resolvable into seven indistinct annulations, caused by the amalgamation of seven distinct joints. This discovery demonstrated that the antennæ were originally, in ages long past, 10-jointed, and had an affinity with such genera as *Athalia* and Phyllotoma. I therefore consider *Blasticotoma* to be an anomalous Selandriid. Like *Athalia*, it probably had its origin in the tropics, and has been changed structurally in its struggle for existence in a colder clime.

In addition to the 4-jointed antennæ, the genus may be further distinguished by the following characters:

Hind wings with two discal cells; claws with a small tooth within; ovipositor subexserted.....Blasticotoma, Klug.

Subfamily III.—SELANDRIINÆ.

This subfamily differs from the others, except the *Blasticotominæ*, by having the lanceolate cell, in the front wings, contracted a little before the middle, but still open, *the contracted part not quite attaining to the submedian vein.* This cell is also sometimes divided by an oblique or transverse nervure between this contraction and its apex, a character frequently found in the *Strongylogasterinæ*, and thus some Selandriines might be easily mistaken for species in that subfamily. The Strongylogasterines, however, are always distinguished by the more elongate shape, the larger, more quadrate head, longer antennæ, longer scape, and by the more distinct costal cell, the costal vein being slenderer, not so much thickened towards apex.

The number of joints in the antennæ, 9–22, readily separate the *Selandriines* from the *Blasticotominæ*. The abdomen is always short, oviform, the head transverse, the temples rather narrow; the vertex, seen from the side, convexly rounded from the ocelli to the base of antennæ; there is no well-marked furrow or groove between the antennæ and the eyes, as in the *Tenthredinidæ*, while the scape is small, not or scarcely larger than the pedicel.

The genera may be readily recognized with the aid of the following table:

Table of Genera.

Antennæ 9-jointed.....3.
Antennæ more than 9-jointed (10- to 22-jointed).
Front wings with four submarginal cells, the second and third each receiving a recurrent nervure.....2.
Front wings with three submarginal cells, the first transverse cubitus absent or indistinct.
Antennæ 10-15-jointed; hind wings with one discal cell.....Phyllotoma, Fallen.

2. Hind wings with one discal cell.
Antennæ 10-15-jointed.....Phyllotoma, Fallen.
Hind wings with two discal cells.
Antennæ 10-11-jointed. ♂ ♀.....Athalia, Leach.
Antennæ 22-jointed. ♂..... Hennedyia, Cameron.

3. Lanceolate cell with an oblique or transverse nervure between the contraction and the apex.....4.
Lanceolate cell without such a nervure.
Front wings with four submarginal cells, the costal vein much thickened before the stigma; hind wings with two discal cells.
Anal cell in hind wings as long or a little longer than the submedian cell; cubitus in front wings strongly angularly bent at its origin; claws strong, simple.....Selandria, Klug.
Anal cell in hind wings shorter than the submedian; cubitus in front wings not angularly bent at its origin; claws with a median tooth beneath.....Paraselandria, Ashm., n. g.
(Type S. flavens, Klug.)

4. Eyes not extending to base of mandibles.....7.
Eyes extending to base of mandibles.
Hind wings with two discal cells.....6.
Hind wings with one discal cell.....5.
Hind wings without a discal cell.
Hind wings with a surrounding nervure at apex, the anal cell shorter than the submedian; claws simple.
♂.....Periclistoptera, Ashm., n. g.
(Type M. alba, Nort.)
Hind wings without a surrounding nervure at apex, the anal cell shorter than the submedian; claws simple.
♀.....Periclistoptera, Ashm.

5. Anal cell in hind wings shorter than the submedian, petiolate at apex, claws with a large triangular tooth at base..... Endelomyia, Ashm., n. g.
(Type M. rosæ, Harris.)

6. Anal cell in hind wings as long as the submedian ; claws simple or with a small tooth within. ♀ ♂ ....Caliroa, Costa.
(=Eriocampoides, Konow.)
(Type E. cinxia, Klug., =C. sebetia, Costa.)

Anal cell in hind wings shorter than the submedian ; claws cleft ..... .Eriocampa, Hartig.

7. Front wings with three submarginal cells, the first transverse cubitus wanting ..... 10.

Front wings with four submarginal cells..... .....8.

8. Hind wings with one discal cell..... 9.

Hind wings with two discal cells ; claws simple..... .Eriocampidea, Ashm, n. g.
(Type E. arizonensis, Ashm.)

Hind wings without a discal cell.
Hind wings with a bordering nervure at apex..... .Tetratneura, Ashm., n. g.
(Type M. ignota, Nort.)

9. Anal cell in hind wings as long or a little longer than the submedian cell. ♀ ..... .Tetratneura, Ashm.

Anal cell in hind wings shorter than the submedian, petiolate at apex ; claws with a tooth beyond the middle..Pœcilostoma, Dahbb.
(=Monostegia, Costa.)

10. Hind wings with one discal cell.
Anal cell in hind wings shorter than the submedian ; claws with a long acute median tooth..... .Pœcilostomidea, Ashm., n. g.
(Type P. maculata, Nort.)

Subfamily IV.—Hoplocampinæ.

This subfamily is at once separated from the others by the distinctly contracted lanceolate cell in the front wings, the contracted part, unlike the Selandriinæ, *extending to and uniting with the submedian vein.* The genera are not numerous, and may be separated as follows :

Table of Genera.

Four submarginal cells, the second and third each receiving a recurrent nervure ; hind wings with two discal cells.

Claws simple.....3.
Claws cleft or with a tooth near the middle .....2.

2. Claws deeply cleft; labrum anteriorly truncate or subemarginate; first joint of flagellum distinctly longer than the second.....Zaschizonyx, Ashm., n. g.
(Type H. montana, Cr.)

Claws with a small tooth beneath, a little beyond the middle; labrum anteriorly rounded, semicircular; first joint of flagellum a little shorter than the second, rarely somewhat longer.....MacGillivraya, Ashm., n. g.
(Type M. oregonensis, Ashm.)

3. Anal cell in hind wings longly petiolated; labrum anteriorly rounded; first joint of flagellum not or scarcely longer than the second.....Hoplocampa, Hartig.

NOTE ON THE LARVA OF MELANOMMA AURICINCTARIUM, GROTE.

This genus will have to be transferred to the Noctuidæ.

Larva cylindrical, feet normal on joints 7–10, 13, about equally developed. Tubercles minute, setæ long, fine, iv. opposite the lower edge of the spiracle, a little nearer to v. than to iii., and rather far behind the spiracle; setæ single, several on the smooth leg plates. Segments obscurely 5-annulate. All green; spiracles small, brown; no marks; cervical shield and anal plate uncornified, invisible. (Head broken off.) Feeds on "hockelberry" (Vaccinium ?).

Washington, D. C., colls. U. S. Nat. Museum.

The larva resembles the Deltoids.

The moth is a Noctuid in venation. In Hampson's tables (which I recommend American students of Noctuidæ to study) I make it fall in the Palindiinæ near the genus *Homodes*, from which it differs in that vein 7 of fore wings does not join the stalk of 8–9 to form an accessory cell, while the third joint of palpi is rather long. Dr. Hulst's account of the genus (Trans. Am. Ent. Soc., XXIII., 294) seems to me erroneous, as I find veins 8–9 long stalked, and 6 arising well above the middle of cell.

HARRISON G. DYAR.

PAPILIO AJAX.—Mr. C. Troxter, Sr., Louisville, Ky., reports that on the 7th of May last a female P. ajax emerged from its chrysalis, which had been kept in a cellar all winter, with all the red on its wings replaced by yellow.

NOTES ON SOME ONTARIO ACRIDIIDÆ.

BY E. M. WALKER, TORONTO, ONT.

(Continued from page 126.)

III.—ŒDIPODINÆ.

10. Arphia sulphurea, Fabricius.

Gryllus sulphureus, Fab. Species Insectorum, I., 369 (1781).

Acrydium sulphureum, Palisot de Beauvois. Ins. d'Afr., et d'Am., 145 (1817).

Œdipoda sulphurea, Burm. Handbuch, II., 643 (1838).

Locusta sulphurea, Harr. Ins. Inj. to Veg., 177 (1862).

Tomonotus sulphureus, Sauss. Rev. et Mag. de Zool., XIII., 321 (1862).

Arphia sulphurea, Sauss. Prodromus Œd. Ins., etc., 71 (1884).

This species is one of the earliest to appear in the spring, making itself conspicuous on the wing by its bright yellow wings and rattling stridulation. It is quite common about Toronto in open, sandy, uncultivated lands, especially where these are scattered with low bushes and scrubby trees. I have never seen it about Lake Simcoe, though there are spots there which would apparently make a suitable home for it.

My earliest capture of the full-winged insect was on May 16th, 1896, though it probably appears some days before that.

I think it very probable that *Arphia xanthoptera*, Germ., is also found in Ontario, but have not as yet seen a specimen from here.

11. Chortophaga viridifasciata, DeGeer.

Acrydium viridifasciatum, DeG. Memoires d'Ins., III., 498 (1773).

Gryllus virginianus, Fab. Syst. Entom., 291 (1775).

Locusta (Tragocephala) viridifasciata, Harr. Ins. Inj., 182 (1862).

" " *infuscata*, Harr. Loc. cit., 181 (1862).

" " *radiata*, Harr. Loc. cit., 183 (1862).

Tragocephala viridifasciata, Thos. Syn. Acrid., 103 (1873).

" *infuscata*, Thos. Loc. cit., 102 (1873).

Chimarocephala viridifasciata, Scudd. Proc. Bost. Soc. Nat. Hist., XIX., 89 (1876).

Chortophaga viridifasciata, Sauss. Prod. Œd., etc., 72 (1884).

This is the first of our locusts, except the Tettiginæ, to make its appearance in the spring. The young are sometimes extremely abundant in the fall, but large numbers perish during the winter, and though often

numerous in early spring, they are much reduced in numbers. They may be seen in sunny sheltered spots quite early in the spring and complete their last transformation about the first or second week in May. They are found until about the middle of July, but are commonest in May and early June.

This species is the least particular about its haunts of all our Œdipodinæ, appearing in open grassy places of almost any kind, whether the soil be a sandy or a clayey one. It seems to be very generally distributed in Southern Ontario. I have seen it at Hamilton, Grimsby, Toronto, DeGrassi Pt., and Clear Lake, Peterborough Co.

The males are almost always of the brown form, *infuscata*, green examples being quite rare. I have, in fact, taken but three specimens of the latter. Of the females, on the other hand, the majority are green, but the relative proportion of the two forms is not nearly so unequal as with the males.

12. Encoptolophus sordidus, Burmeister.

Œdipoda sordida, Burm. Handbuch der Entom., II., 643 (1838).
Locusta nebulosa, Harr. Ins. Inj., 181 (1862).
Encoptolophus sordidus, Burm. Scudd., Proc. Bost. Soc. Nat. Hist., XVII., 479 (1875).

A very local species in Ontario. I have taken only three specimens, 2 ♀ and 1 ♂, at Toronto, and have never seen it about Lake Simcoe. I found it, however, very abundant at Niagara, Sept. 11th, 1893, and its rattling stridulation could be heard from the trolley window all along the line between Niagara Falls and Queenston Heights. My Toronto specimens were taken on the following dates: About Sept. 10, 1892, 1 ♀; Sept. 21, 1896, 1 ♀; Oct. 17, 1897, 1 ♂. It is most commonly found in dry upland pastures.

13. Camnula pellucida, Scudder.

Œdipoda pellucida, Scudd. Bost. Jour. Nat. Hist., VII., 472 (1862).
Œdipoda atrox, Scudd. Ap. Hayden Geol. Survey of Nebraska, 253 (1872).
Camnula pellucida, Sauss. Prod. Œd., etc., 81 (1884).

This is a very abundant grasshopper in many parts of Ontario, especially towards the north. At DeGrassi Pt. it sometimes occurs in positive swarms, rising up from the grass by the dozens at every step. It is not usually as numerous as this, however, though always one of our

commonest grasshoppers. At Toronto it is much less abundant. It prefers dry, grassy upland pastures, but is also commonly found in other dry situations, such as burnt woods on sandy soil.

I have taken the full-winged insect from June 24 till about the beginning of October, but it is not usually seen until July, and specimens taken in late September are apt to be ragged at the tips of the tegmina and wings. I have specimens from Nepigon, Lake Superior, Aug. 27, 1897; Clear Lake, Peterborough Co., July 7 and 16, 1897; DeGrassi Pt., Lake Simcoe, July to late September; Toronto, June and September. West of Ontario, I have taken it at various points along the Canadian Pacific Railway from Manitoba to Vancouver Island.

14. Hippiscus tuberculatus, Palisot de Beauvois.

Acrydium tuberculatum, Pal. de Beauv. Insectes d'Afr. et d'Amer., 145 (1817).

Locusta corallina, Harr. Ins. Inj. to Veg., 176 (1862).

Œdipoda phoenicoptera, Thos. Syn. Acrid., 135 (1873).

Hippiscus phoenicopterus, Thos. Ninth Rep. State Ent., Ill., 117 (1880).

Hippiscus tuberculatus, Sauss. Prod. Œd., etc., 87 (1884).

The "Coral-winged Locust" is rather local in Ontario as far as my experience in collecting goes. Where it does occur, however, it forms colonies of considerable size. It is quite numerous in certain spots about Toronto, but this is the only locality where I have met with it. Dr. Saunders says it is common at London, and Mr. Scudder reports it from Nepigon.

There is a great disparity in the relative number of individuals of the two sexes. Since 1893 I have seen probably more than one hundred males, but have taken but four females.

It is found on light sandy soil, covered preferably with rather long grass and generally with other plants, as lupine, scrub oak, blueberries, etc.

It appears from about the twelfth of May till near the end of June, and I have seen the nymphs late in autumn and again in early spring. Wherever I have found this species it has been associated with Arphia sulphurea.

15. Dissosteira carolina, Linn.

Gryllus (Locusta) carolina, Linn. Syst. Nat., I., 701.

Gryllus carolinus, Fab. Syst. Ent., II., 58 (1775).

Œdipoda carolina, Serv. Hist. Orthop., 722 (1839).
Locusta carolina, Harr. Ins. Inj. to Veg., 176 (1862).
Dissosteira carolina, Sauss. Prod. Œd., 137 (1884).

This large, well-known locust, easily recognized by its black wings with a yellow border, is common everywhere in the settled parts of Ontario, frequenting every dusty roadside during late summer and autumn. It is our most striking species when on the wing on account of its large size, ample wings, and peculiar, butterfly-like flight.

It appears about the beginning of July, the earliest date on which I have taken it being July 2, 1896, and continues till October. I have seen it at Rat Portage, the Muskoka District, DeGrassi Pt., Toronto, Hamilton, and various other places in Southern Ontario which have not been recorded.

16. Spharagemon bolli, Scudder.

Spharagemon bolli, Scudd. Proc. Bost. Soc. Nat. Hist., XVII., 469 (1875).
Spharagemon balteatum, Scudd. Proc., etc., 469 (1875).
Dissosteira Bollii, Sauss. Prod. Œd., 140 (1884).
Spharagemon aequale, Comstock. Introd. to Entom., 103, 104 (1888).

This locust is quite common about Toronto on sandy soil. It is also sometimes seen where the soil is clay, but much less frequently. I have also taken it at Stony Lake, Peterborough Co., and have seen a specimen taken at Sparrow Lake.

The earliest date upon which I have taken it was June 24, 1896 (1 ♂). Its first appearance is generally, however, a little later, and it continues to fly about until October.

Its stridulation is a rapid and rather loud, rattling sound, resembling that of *Arphia sulphurea*.

I should think it not improbable that other species of Spharagemon occur in Ontario, since there are two others in New England, one of which, *S. saxatile*, Morse, frequents rocky unsettled districts, such as abound in the northern part of our Province.

17. Scirtetica marmorata, Harris.

Locusta marmorata, Harr. Ins. Inj. to Veg., 179 (1862).
Œdipoda marmorata, Thos. Syn. Acrid., 111 (1873).
Dissosteira (Scirtetica) marmorata, Sauss. Prod. Œd., 141 (1884).
Scirtetica marmorata, Morse. Prelim. List N. E. Acrid., in Psyche, 105 (1894).

This is one of our most beautiful Acridians, but is very local in distribution. I have specimens taken at Sparrow Lake by Mr. C. T. Curelley, who found them very abundant. I have also taken it, personally, at Gravenhurst, Muskoka District, Sept. 27, 1897, where they were flying in considerable numbers about a dusty gravelly road close to the railway station. They were very rapid in flight, though they never flew very far, and being without a net and pressed for time, only a few were secured. Its stridulation resembles that of *Spharagemon bolli*, but is more rapid, the sound being almost a buzz.

It probably occurs in many parts of our Laurentian area, but I have had, as yet, but little opportunity of collecting in that region.

18. Trimerotropis maritima, Harris.

Locusta maritima, Harr. Ins. Inj. to Veg., 178 (1862).

Œdipoda maritima, Thos. Syn. Acrid., 124 (1873).

Trimerotropis maritima, Stal. Recens. Orth., I., 134 (1873).

On the sandy beaches of Toronto Island this locust flies about the coarse grass which grows at a short distance from the water's edge. In some seasons it occurs in large numbers, in others it is comparatively scarce. I have also two pairs which were taken at Kingsville on the beach of Lake Erie, by Mr. C. T. Hills, who says they were abundant there.

It is an extremely alert species and very difficult to capture, and is almost impossible to see when it alights, on account of the close similarity of its gray tints to those of the sand.

The specimens of this species found about the Great Lakes differ very considerably from the typical form of the Atlantic coast, and may possibly constitute a distinct species. The dark band crossing the wings is much broader than in the typical form, and is uninterrupted instead of being broken up into a series of sub-continuous spots. The greatest breadth of this band is nearly half the greatest breadth of the wing, while in typical *maritima* it is only about a third the greatest breadth of the wing. The base of the wings is yellower and more opaque, resembling S. bolli in this respect. All the markings are generally more distinct, and the tegmina and wings usually somewhat shorter in proportion. It is distinctly smaller in size, judging from specimens of the typical form which I have from Monmouth Beach, N. J. This form appears to be a distinct variety, and may be known as *interior*.

My Toronto specimens were taken between July 22 and about the middle of September, while those from Kingsville are dated Aug. 13, 1897.

19. Circotettix verruculatus, Kirby.

Locusta verruculata, Kirby. Fauna Bor. Amer., Insecta, 250 (1837).

Locusta latipennis, Harr. Ins. Inj. to Veg., 179 (1862).

Œdipoda verruculata, Scudd. Bost. Jour. Nat. Hist., VII., 471 (1862).

Trimerotropis verruculata, Scudd. Daws. Rep. Geol. Rec., 49th Par., 344 (1875).

Circotettix verruculatus, Sauss. Prod. Œd., 175 (1884).

With the exception of *Camnula pellucida*, this is the most abundant Œdipodine in Northern Ontario, where it finds a very congenial home, flying about the bare rocky slopes and among the burnt timber, the loud, crackling stridulation of the males resounding in every direction. It is, however, by no means confined to rocky situations, being found wherever burnt timber occurs, even in swampy places, though preferably on dry sandy soil. I found it in a burnt clearing in a large swamp of tamarack and white cedar near Lake Simcoe at a considerable distance from dry soil.

Nearly all the specimens from Northern Ontario are of a black variety, being thus afforded an excellent protection when they alight upon the blackened stumps and logs, which they very frequently do. This variety has all the markings, except those of the wings, hind tibiæ and inside of hind femora almost entirely obscured by a blackish tone. I have seldom seen specimens of the mottled or southern form, though individuals intermediate between the two extremes are not infrequent. I found a dark brown, somewhat mottled variety common at Bradford on a marshy flat covered with weathered blocks and chips of wood from a sawmill; while in the rocky islands in Stony Lake, Peterborough Co., the specimens met with were frequently ash gray mottled with black.

I have occasionally heard the female stridulate, the sound being similar to that of the male, but more subdued.

It appears about the beginning of July and continues till near the end of September. My earliest capture was at DeGrassi Pt., July 2, 1896, and I heard one stridulating at Gravenhurst, Sept. 27, 1897.

My specimens are from the following localities: Rat Portage, Aug. 28, 1897 (very abundant); Molson, Lake Superior, Aug. 28, 1897; Jackfish, Lake Superior, Aug. 27, 1897; Stony Lake, July 9 to 15, 1897; Bradford, Aug. 6, 1897; DeGrassi Pt., and various other localities about Lake Simcoe. I have also seen it at Aurora, but never at Toronto, though it has occasionally been seen there by other collectors.

A NEW ALEURODES ON OAK.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Aleurodes gelatinosus, n. sp.—Pupa oval, rather less than 1 mm. long, pitch black, not bearing the larval skin, margin beaded; no fringe of the ordinary kind, but the pupa is surrounded by and rests on a gelatinous-looking colourless translucent substance, which extends rather further from the margin than half the diameter of the pupa. Radiating from the pupa, resting on the translucent substance, are three conspicuous lines of white secretion, one from the caudal end, and one from each side of the cephalic end.

Adult with head and body very bright lemon yellow; wings white, semitransparent, spotless. Eyes not divided. Antennæ with second segment at least twice as long as the first; formula for the slender segments 43576.

Hab.—Pupæ abundant on under sides of leaves of oak at Dripping Spring, Organ Mts., New Mexico. Adults emerging the last week of April. The oak, according to Prof. E. O. Wooton, is probably *Quercus arizonica*, Sarg.

AUTUMN CAPTURES.

Our park caretaker unwittingly caters to the wants of the entomologist by planting every year some fine beds of Phlox Drummondii and verbenas. Last year, without a net, I took with a cyanide bottle 59 Plusias in one evening about the 20th of September. I was surprised to find that 22 of them were *Biloba*, the rest were *Precationis*. This year I went to the park on the 17th of Sept., better prepared for taking anything I came across. I caught *Plusia Balluca*, one; *Æroides*, one; *Simplex*, several; and *Precationis*, a few; three Plusias of a species not yet determined; also two *Deilephela lineata;* but the capture of the evening was a very fair specimen of *Dilophonota obscura*, which was not represented in my cabinet. I have two of *ello*, but this insect is at once easily distinguished from it by the description quoted by Mr. Moffat in the last annual report, viz., smaller size, light gray primaries, and unbanded abdomen. I thought the capture was worth recording. I have taken over 40 Heterocea, new to me this season, and my Orillia list is now fairly respectable.

C. E. GRANT, Orillia, Ont.

THREE MYRMECOPHILUS MITES.

BY NATHAN BANKS, WASHINGTON, D. C.

Many American entomologists have, doubtless, been much interested in the accounts published during the past year by Charles Janet on the relations of certain Myrmecophilus Acarians and their hosts. His very interesting papers have been noticed in various English and American journals. Particular attention was paid to two species of Eamasidæ, *Discopoma comata* and *Antennophorus Uhlmanni*.

A few years ago, while collecting mites on Long Island, New York, I obtained three species of Eamasidæ, which were always associated with certain ants. One, a species of Discopoma, is attached to the body of the ant, and appears to obtain food from it in the same manner as its European relative, by piercing the skin. But while the European species appears to choose the abdomen, the American form is, at least generally, found attached to the thorax of the host; and I have not observed more than two mites attached to one ant. There is usually but one mite fastened to the dorsum of the thorax near the median line. In some nests the mites were found on about 10 per cent. of the ants, but in other nests they were much more scarce.

Of the other two mites, one, the Uropoda, was found in considerable numbers associated with the same ant as the Discopoma, but they were not attached to the ants. The other was observed only a few times in the nests of another ant.

The ants have been kindly determined for me by Mr. T. Pergande.

Holostaspis mœstus, n. sp.

Body one and one-half times longer than broad, broadly rounded behind, sides subparallel, narrowed in front on cephalic part, and narrowly rounded in front, quite convex above. Body above with four rows each side of clavate hairs; two lateral rows of about nine hairs, which start from the shoulders; the third row has about ten hairs, one on the cephalic part of body; the sub-median row has about twelve hairs, and starts from the anterior edge of head. On the soft posterior sides is a row of a few small clavate hairs; soft parts of venter with a few simple hairs, and some on the margins of the sternal and genital plates. Anal plate nearly circular, and almost its diameter from the hind border of the ventral plate. Legs of moderate length, clothed with a few clavate hairs on basal joints, and more and simple ones on the apical joints. Length, 1. mm.

In the nest of *Lasius alienus*, var. *americanus;* Sea Cliff, N. Y. Readily known by rows of clavate hairs, and small anal plate.

Uropoda punctulata, n. sp.

Body rather long oval, about one and one-fourth times longer than broad, broadly rounded behind, narrowly rounded in front; moderately convex, both above and below; dorsum with small hairs, mostly on the sides, and a row of much larger and stiffer hairs along the margin, and about four rows each side above, of slightly smaller size than the marginal ones, all erect; hairs of under side confined to the legs and a few on the anal plate; three on each side, and two smaller before anus; sternal plate more than twice as long as widest parts, which are just behind the second and third coxæ, narrowed in front and behind, truncate at each end, rather coarsely, sparsely punctate, anal plate more densely and finely punctate; legs short, concealed in repose, the femora (except I.) slightly margined beneath. Length, .85 mm.

In the nest of *Cremastogaster lineolata* at Sea Cliff, N. Y., Fitch described a Uropoda *(U. formicæ)* found in the nest of an ant, but it is evidently different from this species.

Discopoma circularis, n. sp.

Body nearly circular, a trifle longer than broad, quite convex above, with a rather broad, thin margin all around, alike at each end, so that from top view one cannot tell which is front, clothed above with minute hairs, and many scattered, short clavate hairs, arranged in concentric rows; legs very short, when in repose not showing from above; the sternum elliptical, rather narrowed behind, its margin finely serrate, containing a central plate of same shape in front, but truncate behind; the plate is sparsely punctate, the venter behind is also punctate; the legs are clothed with minute hairs. Length, .48 mm.

Attached to thorax of *Cremastogaster lineolata;* Sea Cliff, N. Y.

A NEW SCALE INSECT FOUND ON BEARBERRY.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Aspidiotus Dearnessi, n. sp.— ♀. Scale suboval, about 2 mm. long, moderately convex, pale gray, more or less concentrically ridged; with the orange-yellow, partly exposed exuviæ quite to one side. Ventral scale thick and distinct. The scales resemble minute oyster-shells.

♀. Dark yellowish-brown, after prolonged boiling in K. H. O. becoming transparent and almost colorless, except that the lobes remain

dark brown. No circumgenital grouped glands. Only one pair of lobes, these short, parallel, very close together, practically contiguous at the tips, their ends broad and obliquely truncate, breadth of a lobe greater than its length beyond the general margin. Apparently no squames. Margin irregularly bluntly serrulate; a small projection near the lobes, and two much larger ones at considerable distances beyond, much in the style of *A. bigeloviæ*. Anal orifice oval, a considerable distance from the hind end. Surface striated, with rows of small round dorsal glands, much in the manner of *A. bigeloviæ*. Mouth-parts large.

♂. Scale elongate, nearly parallel-sided, light brownish, with the pale orange exuvia at one end, when fresh covered by a film of white secretion.

♂. Brownish-yellow, with ample wings.

Hab.—Crowded on twigs of *Arctostaphylos uva-ursi*, collected on "shore of Lake Huron," Aug. 20, 1898, by Mr. J. Dearness.

This interesting species is not a *Diaspidiotus*, but is evidently allied to the south-western group composed of *A. bigeloviæ*, *A. yuccæ* and *A. yuccarum*. At the same time it is allied to *A. Signoreti* of Europe, which is the type of the subgenus *Targionia*, Signoret. For the present I believe we cannot do better than extend the subgenus *Targionia* to include all these five species.

[In his note to the Editor, Mr. Dearness states that the precise locality where he collected the infested plants was in the Ojibeway Indian Reserve in Saugeen, in the Bruce Peninsula, on the sandy shore of a little bay off Lake Huron, a favourite botanizing ground of Dr. Scott, of Southampton, Ont. Mr. Dearness does not know whether the inlet is generally known by the name of "French Bay," but that is what the Doctor calls it.]

A CORRECTION.

In an article in the October, 1897, number of the CAN. ENT., page 243, I used the name *subfasciatus* in describing a new species of Attalus from San Clemente Id. I have since discovered that this name had been previously used by Gorham for a Mexican species, and I would therefore propose the name *transmarinus* for the San Clemente species. Oddly enough, in looking over the Horn collection the past summer, I found specimens of *subfasciatus*, Gorh., labelled Arizona; the name must therefore enter our lists.

Superficially *subfasciatus* and *transmarinus* resemble each other very closely, but the latter may be at once distinguished by the prothorax being sinuately narrowed behind so as to produce the appearance of being broadly lobed, while in *subfasciatus* it has the normal form.

H. C. FALL.

NOTES ON ANDRENA.

BY S. N. DUNNING, HARTFORD, CONN.

ANDRENA HALLII, n. sp.

♀.—Lenth, 14–17 mm. Black, shining; pubescence black with patch on vertex, the prothorax, mesothorax (excepting posteriorly where pubescence is not so thick and has black mixed with ferruginous, forming a more or less distinct black-appearing band between the tegulæ), scutellum and postscutellum bright ferruginous, thick, entirely obscuring punctures on thorax. Clypeus shining, large quite close punctures, a median line impunctured; antennæ black, third joint equal to fourth and fifth combined; metathorax not shining, closely and more finely punctured; scutellum with two smooth shining spots anteriorly, a few scattered punctures near-by, otherwise roughened; postscutellum and metathorax roughened, enclosure triangular, distinctly outlined, carried to a point on posterior face, sometimes faintly and irregularly wrinkled in fore half, last half impunctured. Abdomen without hair bands, a few long scattered hairs on segments 3–4, 5th seg. pubescent and protuberant as is *vicina;* anal fimbria heavy, black; segments 1–4 depressed posteriorly, the first very slightly if at all, the remainder one-third or one-half of their length; fine scattered punctures on seg. 1–3, remainder impunctured; a sweep of hairs below like *vicina.* Wings dusky throughout, a violaceous reflection, otherwise like *vicina;* stigma and nervures piceous or very dark brown. Claws bifid, rufous; spurs black. Basal process of labrum prominent, emarginate.

Three females. Pullman, Wash. (coll. C. W. Piper), and Moscow, Idaho (J. M. Aldrich).

It differs at once from *vicina* by pubescence and punctures of clypeus.

A. MARIÆ, Rob.

Three females. Ames, Iowa (E. D. Ball); one from flowers of gooseberry, May 6th.

A. RHODURA, Ckll.

Two females on *Salix*, April 25th, at Hartford, Conn.

A. CASADÆ, Ckll.

Two females on *Holodiscus discolor*, Evergreen, Colo. (about 7,000 feet), July 16. One specimen shows the second segment rufous throughout. Prof. Cockerell thinks a large series may show this species to be synonymous with *prunorum.*

A. KINCAIDII, Ckll.

This species varies like *Synhalonia Edwardsii*, Cr. (see paper by Cockerell, Proc. Acad. Nat. Sc., Sep. '97, page 347), but owing to the unsatisfactory nature and variability of the differences I have not named the races into which it falls.

(1) Typical *Kincaidii*. Seattle, Wash. 3 ♀: Vancouver Is., B. C., 2 ♀ (July 1 and July 5); Moscow, Idaho, 1 ♀. This has the abdomen more ovate in ♀.

(2) A geographical race. Pullman, Wash. 3 ♀. Abdomen subdepressed in ♀.

My male specimens are all from Seattle and Vancouver. The only differences they show is in colour of pubescence as mentioned by Cockerell in the original description.

A. PERARMATA, Ckll. (in ed.)

I have males from Seattle, Wash. (Feb. 16 – Mch. 14), and females from Seattle (March 13–14), and Vancouver Is. (Apr. 20).

APHILANTHOPS BAKERI.

♂. The "lobes" in the co-types take the form of dentations in a larger series. Third joint antennæ *as long or almost as long* as joints 4–5 combined. The first abdominal segment is a *little* coarser in punctuation than the rest. Sometimes a yellow spot is on the mesothorax in front of the tegulæ.

♀. Differs from ♂ in larger size (12–13 mm.), face with three broad yellow stripes (not *all* yellow), clypeus 5-dentate. Montana and Colorado, Coll. Amer. Ent. Soc. and Colo. (Baker 2044). The ♀ is much like *frigidus;* the ♂ shows differences, however.

DIASPIS AMYGDALI, TRYON.

BY C. P. LOUNSBURY, DEPARTMENT OF AGRICULTURE, CAPE TOWN, AFRICA.

The article on *Diaspis amygdali*, Tryon, by Professor Webster, in the April issue of this magazine, has left me with the impression that the introduction of this insect to several widely separated sections of the United States has not aroused the apprehension among American entomologists that the advent of a pest of its importance justifies. The quotation from Mr. Tryon's letter to the effect that the insect is neither widely distribued nor destructive in Queensland is too reassuring. It constrains me to emphasize the fact that the species is a highly injurious

one in Cape Colony. A brief account of its occurrence here may not be uninteresting.

Under various common names, this insect has been known about Cape Town for at least twenty-five years. Owing to the slight attention paid to fruit culture until within a comparatively short time, and also to the lack of transportation facilities, it has not, however, become nearly so widespread as would have been the case had such favourable conditions as are found in the United States prevailed. And yet, despite of adverse circumstances, it has become established at many of the principal centres, both east and west, and in the country adjacent to the seaports. One serious occurrence in the Transvaal has been reported to me, and M. d'Emmerez de Charmoy, of the Museum at Port Louis, writes that it is destructive in Mauritius. From Cape Town, it has spread inland for about one hundred miles, and within this area I do not think there is any orchard insect pest, with the exception of the Fruit Fly *(Ceratitis capitata)*, that gives greater trouble.

The peach is pre-eminently the food-plant of *Diaspis amygdali*, and notwithstanding the vigorous growth it makes in this climate, this tree is not infrequently killed to the ground; more often, branch by branch dies, and the tree becomes misshapen and unproductive. Reddish stains, both in the rind and pulp, are produced on the fruit of some varieties; and if the attack begins when the fruit is very green, malformation results. Many other food-plants are cited by Professor Webster, but the list might be greatly lengthened. The China Tree *(Melia azedarach)*, known here as Syringa, a tree adapted to the requirements of several of our common scale pests, sometimes gets thoroughly coated with this one. Many Solanaceous plants assist in passing the infection from orchard to orchard; chief among these are *Solanum sodomæum*, *S. giganteum* and *S. aculeastrum* (?) (Natal Thorn). *Myoporum insulare*, chiefly grown here as a hedge plant, is similarly responsible. Fortunately, the pomaceous fruits are nearly exempt from attack; I have not seen it at all on apple, and not on more than a dozen pears.

Upwards of fifty per cent. of the insects are here destroyed by parasites on many trees, and a further large percentage is devoured by Coccinellids. But the loss might be ninety-five per cent., and still the increase be a hundred fold in twelve months. Three to four generations are passed in a year, and two hundred young from one female is not exceptional. The multiplication may prove less rapid in the Northern

States, but it is reasonable to suppose that many years may elapse before natural enemies prey on it there to the extent that they now do here.

That the insect is not an easy one to contend against in the United States may be inferred from the results obtained in the experiments recorded by Dr. Howard. In this warm climate the Californian lime-sulphur-salt wash will keep it in check if the wash is well made and thoroughly applied, and fumigation with hydrocyanic acid gas destroys eggs and all other stages when one ounce of cyanide is used for each one hundred and fifty cubic feet of enclosed space. Many suburban people have all their stone-fruit trees protected by whitewashing them from the ground to the tips of the twigs every winter.

All in all, I consider that *Diaspis amygdali* is almost as much to be feared in the peach orchard as *Aspidiotus perniciosus*. The whiteness of the scale renders the former easier of detection, it is true, but conspicuous as it is by reason of its colour, people here often unwittingly infect nursery stock in the process of budding. American nurserymen and fruit-growers are not, I feel sure, any the less likely to commit such a blunder. The insect is fond of secreting itself behind buds on young wood, and much of it is often to be found in such situations when the twigs elsewhere are quite clean.

STATE ENTOMOLOGIST OF NEW YORK.

We beg to offer our hearty congratulations to Mr. M. V. Slingerland upon his appointment to the important position of Entomologist to the State of New York. We may also congratulate the authorities of the State upon having selected one so eminently fitted for the position. Mr. Slingerland is a graduate of the College of Agriculture of Cornell University, and for the last eight years has been a member of the University Experiment Station at Ithaca. In this capacity he has published a number of admirable bulletins on injurious insects, and a large number of articles of a popular character on practical entomological subjects in various agricultural papers. He has also contributed to this magazine and to other scientific publications, many valuable papers of a more technical character. He has thus proved himself to be thoroughly well qualified to carry on the work at Albany, both in its scientific and practical departments, in accordance with the high standard maintained by his eminent predecessors, Drs. Asa Fitch and J. A. Lintner.

ABBREVIATIONS OF AUTHORS' NAMES.

BY A. RADCLIFFE GROTE, A.M., HILDESHEIM.

It is quite desirable that the names of authors should be uniformly treated according to a certain standard. To this end the Zoologists of the Berlin Museum have published a list, which has now appeared in a second edition. It is quite necessary that names which are borne by different persons, owing to their prevalence, should be so abbreviated that the particular bearer intended is designated. I give here a selection of the abbreviations of the names of chiefly American authors determined upon, and call attention to the pamphlet which is published by R. Friedländer and Sohn, Berlin :

Aaron ..... Aar.	Grote, A. R ..... Grote.
Abbot ..... Abb.	Guenée, A ..... Guenée.
Berg, C ..... Berg.	Gundlach ..... Gdl.
Boisduval ..... Bsd.	Harris ..... Harr.
Butler ..... Butl.	Harvey ..... Harvey.
Casey, Th. L ..... Casey.	Herrich-Schaeffer ..... H.-Sch.
Chambers ..... Chambers.	Howard, L. O ..... How.
Clemens ..... Clemens.	Hübner ..... Hb.
Comstock, J. H. ..... Comst.	Hulst ..... Hulst.
Coquillett ..... Coquill.	Packard ..... Pack.
Cresson ..... Cress.	Reakirt ..... Reak.
Crotch ..... Crotch.	Robinson ..... Rob.
Duzee, Van ..... Duzee.	Schwarz, E. A ..... E. A. Schw.
Edwards, H ..... H. Edw.	Scudder ..... Scudd.
Edwards, W. H ..... W. H. Edw.	Smith, Emily A ..... E. A. Sm.
Fabricius ..... F.	Smith, J. B ..... J. B. Sm.
Fernald ..... Fern.	Smith & Abbot ..... Sm. Abb.
French, G. H ..... French.	Walsingham ..... Wlghm.

ENTOMOLOGICAL BOOKS.

We have much pleasure in informing our readers that entomological books of all kinds can now be imported into Canada free of all customs duty, and that this concession was made by the Dominion Government in consequence of the representations made to it by the President and Council of the Entomological Society of Ontario.

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NEW SPECIES OF NORTH AMERICAN MYRMELIONIDÆ.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

IV.

Brachynemurus brunneus, new species.

Male.—Length, 40 mm.; expanse of wings, 55.4 mm.; greatest width of anterior wing, 6.4 mm.; length of antenna, 7 mm. Slender, prevailing colour fuscous, markings luteous; sparsely clothed with black and white hairs, more thickly so on abdomen.

Face scarcely convex; lower part luteous; covered above by a broad piceous band which encircles the antennæ; furrow between face and inner orbit of the eye fuscous. Circumocular area luteous, except along vertex, where it is mostly dark fuscous, and near the maxillary palpiger, where there is a fuscous spot. Clypeus* luteous, rather short. Labrum transverse, luteous; rounded laterally and narrowed anteriorly, emarginate in front. Mandibles piceous, black at tips.

Maxillary palpi of moderate length, luteous, tinged with piceous apically, the fifth joint especially so; first two joints short, subequal in length, the first one about as broad as long, the second less broad; third joint somewhat longer than first two together, perceptibly curved, enlarged apically; fourth joint straight, considerably shorter than third; fifth joint somewhat longer than third, subcylindrical, notched at tip.

Labial palpi about same length as maxillary or slightly longer, luteous, more or less tinged with piceous apically; first joint about twice as long as broad; second joint somewhat more than twice as long as first, slightly curved, enlarged apically; third joint about same length as second, fusiform; tip narrowed and notched.

Maxillary palpigers luteous, clouded with piceous. Labium and labial palpigers luteous; mentum luteous, clouded with piceous posteriorly, with a long black bristle; in front a longitudinal median black

*One male specimen, labelled "Dunsmuir, Cal., Wickham," has a faint transverse fuscous line or series of dots separating the face from the clypeus. The female specimens have a fuscous clouding on each side of clypeus.

line passing between the labial palpigers to the basal portion of the labium. Gula luteous, clouded with darker.

Antennæ somewhat clavate, as long as head and thorax, fuscous, darker before tip, sparsely covered with very short stiff black hairs; first two joints piceous, luteous at articulations; a luteous crescent bounds base of first joint in front.

Vertex elevated behind, rounded, luteous; in front, on depressed portion, dark fuscous; behind, on elevated portion, two dark fuscous bands*, the posterior irregular and spread out each side so as to approach, sometimes to meet, the anterior band. Behind this a median, oval, black or rufo-piceous spot.

Pronotum dark fuscous; a longitudinal median luteous line and one each side†. Sides of pronotum luteous, divided by a fuscous line‡. Lateral carinæ luteous. Below luteous, marked on each side with dark fuscous.

Mesonotum fuscous; lobes moderately elevated; anterior lobe with a longitudinal median line and a dot or two luteous; each lateral lobe marked with two luteous lines on its inner side; a luteous spot or two also near articulation of wing; posterior lobe with a longitudinal median luteous line, sides and rear of the lobe also margined with luteous. Sides and beneath fuscous, marked with luteous.

Metanotum fuscous; anterior lobe margined in front with luteous, with a longitudinal median luteous line; patterned similarly to mesonotum, the inner luteous line of lateral lobe forming a rough triangle, the apex of which is near middorsal line. Sides and beneath fuscous, marked with luteous.

Abdomen fuscous, articulations luteous; segments luteous above, especially at base, with a longitudinal median fuscous line.

Appendages one-half the length of seventh segment, slender, arcuate for their posterior halves, somewhat flattened laterally; fuscous, luteous near tips; clothed with coarse black bristles; there is the usual triangular fuscous plate between the appendages below; this plate is luteous apically.

*In one male specimen, collected at Dunsmuir, California, by Mr. H. F. Wickham, the anterior band is very indistinctly separated from the fuscous depressed portion of the vertex.

†This line is usually most distinct in front of the transverse furrow, where it becomes a good-sized spot; it is interrupted at the furrow and in the male specimens is only faintly indicated behind it.

‡This line is divided into two parts in the females.

Legs of moderate size, luteous, with black and pale hairs and spines; dotted with piceous at bases of the spines, these dots sometimes coalescent in places; tibiæ piceous at bases and apices, each with a transverse piceous line on basal half externally. Tibial spurs longer than first tarsal joint, slightly curved, rufo-piceous; spurs of anterior and middle tibiæ longer than those of posterior. Tarsal joints piceous at their apices, the third and fourth especially so; claws a little more than half the length of last tarsal joint, moderately curved, rufo-piceous.

Wings of moderate size, hyaline. Venation hairy. Pterostigma whitish, fuscous on inner side. Apical third or more of veins of intercostal series forked. Veins light brown or fuscous, interrupted irregularly with paler; the subcostal vein darker, with a distinct luteous mark between each transversal.

Anterior wings marked as in *B. niger**, but the markings less extended and light brown in colour. Posterior wings almost immaculate. Posterior borders of both wings fringed with fine hairs.

Female.—Length, 31 mm.; expanse of wings, 58.5 mm.; greatest width of anterior wing, 6.3 mm.; length of antenna, 6 mm.

Antennæ more clavate than in male; first joint luteous behind, the following joints luteous at articulations, especially the basal ones. The luteous markings are more extended and distinct than in the males. A luteous spot or band is present between the antennæ.

Anterior fuscous band of the vertex continued posteriorly along the longitudinal median furrow; the posterior band appears like an irregular group of more or less coalescent fuscous spots, divided at the median furrow.

Abdomen somewhat shorter than wings, marked similarly to that of male, but there is little luteous on basal segments above except at middle of segments and at their articulations, the middorsal fuscous line hardly apparent†.

Tip of abdomen luteous, clouded with fuscous; clothed above with black hairs; superior parts split; inferior parts beset with coarse black spines; below two small cylindrical luteous appendages, three times as long as broad, with some very long black hairs or bristles.

Wing markings and veins somewhat darker than in males.

*Can. Ent., XXX., 5, 1898, p. 136.

†Two of the females (co-types) have this line quite apparent, especially the specimen from Los Angeles, California, collected by Mr. D. W. Coquillett.

Type.—No. 4073, U. S. National Museum. One male specimen collected by the author at Fountain, Yellowstone National Park, August 10, 1896.

No. 4073a, U. S. National Museum. One female specimen collected by the author at Sage Creek, Wyoming, July 28, 1896.

Co-types.—Collection, U. S. National Museum. One male collected at Dunsmuir, California, by Mr. H. F. Wickham; one male collected in Los Angeles County, California, in September, by Mr. D. W. Coquillett; two females with no labels; one female from Los Angeles County, California, collection of D. W. Coquillett.

The female of this species resembles *B. niger*, but is lighter coloured, the wing markings are lighter and less extended, and the labial palpi are normal.

A BRIGHT RED PARASITE OF COCCIDÆ.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Aphycus Howardi, n. sp.—♀. Length about 1 mm.; entirely bright scarlet, except the brown antennal club, sage-green eyes, and white tarsi; with the apical portion dusky. Wings dull hyaline, with a dark cloud ending at stigmal vein, whitish just beyond and hyaline at tip. Scape not dilated, club about or almost as long as the four joints before it. Mesonotum and scutellum with numerous short white hairs, mesonotum with no naked spots; mesopleura very delicately shagreened, with no longitudinal impressions.

Hab.—Mesilla Park, New Mexico; bred from *Eriococcus Tinsleyi*, Ckll., on *Atriplex canescens;* collected by Prof. J. D. Tinsley. Emerged August 6th, and some days following. The colour of this beautiful little *Aphycus* is just like that of *Perdita luteola* when reddened by cyanide, and I should certainly have considered it as due to the same cause, had I not seen the species alive. The original type is now in the U. S. Nat. Museum; two or three others were bred after the description had been written. *A. Howardi* is named after Dr. L. O. Howard, in recognition of his valuable work on the parasites of Coccidæ. He has now in press a revision of the genus *Aphycus*, and the present insect was found just too late to be included in it. He has very kindly informed me that it is distinct from all the species known to him or published by others, and has given me some notes on its specific peculiarities.

NEW SPECIES OF SAPROMYZIDÆ.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Genus SAPROMYZA.

1. Wings hyaline, unmarked.....3.
   Wings brown along the costa, the small and the posterior crossveins; body and its members, except the wings, yellow, antennal arista brown, second joint of hind tarsi sometimes black; three pairs of dorso-centrals, one of acrostichals, and two sternopleural macrochætæ.....2.
2. Costa and apex of wing, from the base to beyond apex of fourth vein, broadly bordered with brown, which is widely separated from the brown of the crossveins; second joint of hind tarsi yellow, third antennal joint oval, one and one-third times as long as wide, arista with a scarcely perceptible pubescence. Length, 3.5 mm. Chiric Mts., Ariz. A female specimen collected May 31, 1897, by Mr. H. G. Hubbard. Type No. 4082, U. S. Nat. Museum. *Hubbardii*, n. sp.
   Costa and apex of wing, from slightly beyond humeral crossvein to beyond apex of fourth vein, broadly bordered with brown, which is connected with the brown of the small crossvein, and sends a spur which almost reaches the hind crossvein; second joint of hind tarsi yellow, third joint of antennæ elongate oval, almost twice as long as wide, arista short plumose. Length, 3 mm. Oswego, N.Y. A female specimen collected August 1, 1895, by Prof. Chas. A. Sheldon. Type No. 4083.....*Sheldoni*, n. sp.
   Costa and apex of wing, from tip of auxiliary vein to beyond apex of the fourth, broadly bordered with brown, except a short space between the apices of the second and third veins, where the brown is very narrow; the brown sends a spur to the small crossvein and another which almost reaches the brown of the hind crossvein; second joint of hind tarsi black, third antennal joint oval, one and one-half times as long as broad, arista short plumose. Length, 3.5 mm. New Bedford, Mass. A male specimen collected by Dr. Garry de N. Hough. Type No. 4084.....*Houghii*, n. sp.
3. Face, pleura and scutellum destitute of round black spots.....4.
   Face marked with one, pleura and scutellum each with two black spots; yellow, an ocellar dot, first two joints of antennæ, spot on lower edge of face, one near middle of mesopleura, another on front end of sternopleura, one on each side of middle of scutellum,

and a basal one on each side of the third, fourth and fifth abdominal segments, black; a brown dorsal line on the last three abdominal segments, and indications of one on the mesonotum; two pairs of dorso-centrals, no acrostichals, one sternopleural macrochæta; third antennal joint oval, one and one-half times as long as wide. Length, 3 mm. Biscayne Bay, Fla. A female specimen collected by Mrs. A. T. Slosson. Type No. 4085 ..... *Slossonæ*, n. sp.

4. Mesonotum opaque black or yellowish ..... 5.

Mesonotum polished black; black, highly polished, the first two antennal joints, base and lower edge of the third, base of arista, lower edge of front above the antennæ, halteres, femora, tibiæ, middle and hind tarsi and base of first joint of the front ones, also the front coxæ, yellow; four pairs of dorso-centrals, one of acrostichals, and one sternopleural macrochæta; third antennal joint scarcely tapering toward the tip, two and one-half times as long as broad, arista short plumose, wings strongly tinged with yellow. Length, 4 mm. Vancouver Island, British Columbia. Two male specimens collected by Mr. C. Livingston. Type No. 4086 ..... *Livingstoni*, n. sp.

5. With three pairs of dorso-central and two sternopleural macrochætæ. 6.

With only two pairs of dorso-central and one sternopleural macrochæta; yellow, the front except the lower edge, the mesonotum, scutellum, metanotum, and a vitta on upper part of the pleura, black, opaque bluish-gray pruinose, a black spot on each side of the third, fourth, fifth and sixth segments of the abdomen; third joint of the antennæ oval, one and one-half times as long as wide, arista long plumose. Length, 3 mm. Onaga, Kansas. A female specimen collected by Mr. F. F. Crevecoeur. Type No. 4087 ..... *Crevecoeuri*, n. sp.

6. Antennal arista long plumose, body very robust, wings tinged with yellow, scarcely more than twice as long as the abdomen ..... 7.

Antennal arista bare, body slender, wings unusually long, over four times as long as the abdomen; black, gray pruinose; the antennæ, front legs, and middle and hind femora, brown; middle and hind tibiæ and their tarsi, yellow, halteres whitish; wings not tinged with yellow, third antennal joint only slightly tapering toward its tip, nearly twice as long as wide. Length, 3.5 mm. White Mts., N. H. One male and five females, collected by the late H. K. Morrison. Type No. 4088. ..... *brachysoma*, n. sp.

7. Thorax and entire insect yellow, a black spot in middle of occiput above the neck, a light yellow fascia above the antennæ, bordered above and below with brown; third antennal joint only slightly tapering to the tip, one and two-thirds times as long as wide. Length, 5 to 5.5 mm. Los Angeles Co., Cal. (H. C. Fall); Corvallis, Oregon (A. B. Cordley), and Seattle, Wash. (O. B. Johnson). Two males and four females. Type No. 4089.....*flaveola*, n. sp.

Thorax, scutellum, occiput and upper half of front, brown, bluish-gray pruinose; a yellow fascia above the antennæ, bordered above and below with brown, face yellowish, a U-shaped brown mark in the middle and a black line extending obliquely from each antenna to the occiput near the oral margin; antennæ, proboscis, palpi, halteres and legs yellowish, front side of femora sometimes marked with a gray vitta, apex of tibiæ and a faint ring near base of each, brown; abdomen yellowish, bases of the third, fourth and fifth segments, brown; third joint of antennæ slightly tapering to the apex, nearly twice as long as broad. Length, 5 to 6.5 mm. Dist. Colum. Four males and twenty females, collected by the writer in June, 1894. Type No. 4090.....*magna*, n. sp.

Genus LAUXANIA.

1. Submarginal cell at the small crossvein less than three-fourths as wide as the length of the hind crossvein, wings more than three times as long as wide, hyaline or yellowish.....2.

Submarginal cell at the small crossvein wider than the length of the hind crossvein; black, the first two joints of antennæ, base of arista, and first three joints of the middle and hind tarsi, yellow; front and face polished, the lateral margins narrowly white pruinose; antennæ linear, more than twice as long as the head, the third joint eight times as long as wide, arista rather long plumose; body polished, mesonotum thinly gray pruinose; wings twice as long as wide, smoky-brown, the posterior margin gray. Length, 3.5 mm. Florida (Mrs. A. T. Slosson), and Georgia (H. K. Morrison). One male and six females. Type No. 4091.....*latipennis*, n. sp.

2. Antennal arista brown, long plumose, its base yellow; black, the first two joints of antennæ, base of the third, bases of tibiæ, first joint of front tarsi and first three joints of the others, yellow; antennæ slightly tapering toward the apex, one and one-half times as long as head, the third joint five times as long as broad; face with a

median vitta, spot near the oral margin each side of the middle, and the narrow lateral margins, whitish pruinose; front slightly polished, the broad lateral margins, except on their lower part, thinly gray pruinose; body polished, two vittæ on the mesonotum, scutellum and front part of pleura thinly gray pruinose; wings tinged with yellow. Length, 3 mm. Lake Worth, Fla. (Mrs. A. T. Slosson), and Georgia. Three males and nine females. Type No. 4092..... ....*facialis*, n. sp.

Antennal arista white, short plumose, its base yellow; black, the first two joints of the antennæ, base of the third, halteres, front coxæ, front femora and broad apices of the others, all tibiæ, and the middle and hind tarsi except their apices, yellow; antennæ slightly tapering toward the apex, slightly longer than the head, the third joint four times as long as wide; front and face polished, the latter whitish pruinose near the lower part of each eye; body polished, mesonotum and scutellum with a strong coppery lustre, thinly brownish pruinose; wings tinged with yellow. Length, 3.5 mm. Santa Cruz Mts., Cal. A male specimen, collected by Mr. A. Koebele. Type No. 4093..... *albiseta*, n. sp.

Genus Pachycerina.

Yellow, an ocellar spot, tip of antennæ, the arista, apical half of palpi and three vittæ on the mesonotum, black; antennæ almost as long as the head, slightly tapering to the tip, the third joint three and one-half times as long as wide; front and sides of face polished, middle of face thinly whitish pruinose, body polished, wings hyaline, slightly tinged with yellow. Length, 3.5 mm. St. Augustine, Fla. Two female specimens, collected by Mr. C. W. Johnson. Type No. 4094.....*clavipennis*, n. sp.

Genus Trigonometopus.

Yellow, two vittæ on the front, four on the mesonotum, the upper side of the scutellum and the metanotum, brown, antennal arista white, with a very short pubescence; head subopaque, mesonotum and scutellum opaque, abdomen somewhat polished; wings hyaline, small and posterior crossveins bordered with brown, two circular brown spots on the last section of the third vein, the outer one almost directly in front of the posterior crossvein. Length, 3.5 mm. Colorado. A female specimen. Type No. 4095.*punctipennis*, n. sp.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 6.)

FAMILY XII.—NEMATIDÆ.

This family is very sharply separated from the *Selandriidæ*, *Dineuridæ* and the *Tenthredinidæ* by having only one marginal cell in the front wings, while from the *Hylotomidæ*, *Lophyridæ*, *Perreyiidæ* and the *Pterygophoridæ*, which also have only one marginal cell, it is readily distinguished by pteropterological and antennal characters, and especially by the basal nervure in front wings uniting with the subcostal vein far from the origin of the cubitus.

Our species have been subjected recently to a thorough revision by Mr. C. L. Marlatt, in a work entitled: "Revision of the Nematinæ of North America, etc. Technical Series No. 3, U. S. Department of Agriculture, Washington, 1896."

Mr. Marlatt's "Revision" is typical of the best kind of systematic work, and the Department of Agriculture is to be congratulated on publishing works of such a high degree of merit.

The publication by our Government of technical works, on special groups of insects of an economic importance, is an excellent feature in the present administration and one that I trust will become permanent. These publications not only contribute towards filling a void in our literature, draw attention of our farmers, fruit-growers and laymen to the necessity and importance of the study of insects, but also act as a stimulant to our students, and greatly advance systematic and economic entomology.

In his revision Mr. Marlatt followed Konow and placed the genera *Dineura* and *Hemichroa* with the *Nematinæ*. In this I cannot agree, since they seem to me to have very little affinity, if any, with this group. Their affinities are almost equally divided between the *Selandriidæ* and the *Tenthredinidæ*, but with characters sufficiently distinct to justify one in placing them in a family by themselves.

It may be well here also to call attention to the position Mr. Marlatt assigned one of his species, viz., *Pachynematus gregarius*. Dr. Dyar*, in describing the larva of this species, expressed surprise at the position

*Journ. N. Y. Ent. Soc., Vol. V., p. 30.

assigned the imago by Mr. Marlatt, since the larva was so different from other Pachynematus larvæ he had bred. He says: "I was much surprised that the flies should belong to *Pachynematus*. The larvæ of this genus are solitary grass feeders, whereas a larva very similar to this species is described as that of a species of *Pristiphora*."

On making a careful study of the type, I find it really belongs to the genus *Micronematus*, Konow, and has nothing to do with *Pachynematus*. This result was a great surprise to me, because Mr. Marlatt, in speaking of the genus *Micronematus*, says: "This genus seems to be of doubtful value, and at least has no American representative."

The genus, as my table shows, is a good one, falling near *Pristiphora*, where Dyar would have it placed from larval characters, and it is quite evident that Marlatt misinterpreted some of Konow's characters, since the genus as tabulated by him cannot be recognized.

The family *Nematidæ*, as here defined, may be divided into two subfamilies as follows:

Table of Subfamilies.

Lanceolate cell widely contracted at the middle and closed ..... Subfamily I., Cladinæ.
Lanceolate cell petiolate ..... Subfamily II., Nematinæ.

Subfamily I.—Cladinæ.

The species belonging to this subfamily are readily distinguishable by the widely-contracted lanceolate cell, the contracted part uniting with the submedian vein and leaving a closed cell at base.

To this group belong five genera distinguishable by the aid of the following table:

Table of Genera.

Second submarginal cell receiving both recurrent nervures ..... 4.
Second and third submarginal cells each receiving a recurrent nervure, or if the first transverse cubitus is wanting it is the first and second submarginal cells which receive the recurrent nervures.
  Male characters ..... 2.
  Female characters.
    Antennæ somewhat compressed, with a sharp projection at tip of basal joint, the third joint with a sinus beneath at the middle, so that the joint is narrower at middle than at the base or tip ..... Cladius, Illiger.
    Antennæ normal, cylindrical, not compressed, claws cleft.

Third joint of antennæ slightly curved or slenderer at the middle, with a short projection at the base, not longer than the fourth.....Trichocampus, Hartig.

Third joint of antennæ simple, uniformly thickened.....Priophorus, Latreille.

2. Antennæ simple, or at most with the third joint alone forked.....3.

Antennæ with joints 3–5 and sometimes 6–7 with a more or less prominent branch at apex.....Cladius, Illiger.

3. Antennæ with the third joint bent or a little slenderer at the middle, and usually with a short blunt process beneath; second recurrent nervure in hind wings interstitial or uniting with the cubitus *beyond* the second transverse cubitus.....Trichiocampus, Hartig.

Antennæ simple, the third joint uniformly thickened; second recurrent nervure in hind wings joins the first submarginal cell *before* the second transverse cubitus.....Priophorus, Latreille.

4. Front wings with four submarginal cells; claws bifid.

♀ with the abdominal segments 7–8 not carinate; ♂ with the last abdominal segment entire, without a median furrow.....Camponiscus, Newman.

Front wings with three submarginal cells (rarely with four); claws simple.

♀ with dorsal abdominal segments 7–8 with median carinæ; ♂ with the last dorsal abdominal segment with a median furrow.....Anoplonyx, Marlatt.

Subfamily II.—Nematinæ.

This subfamily is distinguished from the *Cladinæ* by the distinctly petiolated lanceolate cell, the anal vein being always absent at base; the second submarginal cell, or the first if the first transverse cubitus is wanting, always receives both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus.

About a dozen genera are known, readily distinguished by the aid of the following table:

Table of Genera.

Costal transverse nervure interstitial with the apex of the basal nervure or placed a little beyond it.....10.

Costal transverse nervure never interstitial with the apex of the basal nervure, always placed somewhat before it.

Claws bifid or cleft.....5.

Claws with a small or short tooth beneath, a little beyond the middle, and which projects nearly at a right angle.....2.

Claws simple, without a tooth.

First and third submarginal cells small, nearly equal, united shorter than the second; clypeus emarginate..... Gymnonychus, Marlatt.

2. Clypeus anteriorly truncate or at most only slightly emarginate; first transverse cubitus often wanting.....3.

Clypeus anteriorly distinctly emarginate; first transverse cubitus always distinct.

Marginal cell in hind wings at apex pointed, with an appendage, the second recurrent nervure usually uniting with the first submarginal (first discal) cell, at about two-thirds its length..... Pachynematus, Konow.

3. Marginal cell in hind wings at apex pointed, *with* an appendage; head with the frontal area most frequently wanting, rarely distinct....4.

Marginal cell in hind wings pointed, *without* an appendage; head with the frontal area distinct.

Second recurrent nervure in hind wings received by the first submarginal cell at about two-thirds its length, or a little before, rarely very near its apex; last dorsal abdominal segment in ♂ with a carina extending to apex..... Lygaeonematus, Konow.

4. Hind wings with the second recurrent nervure received by the first submarginal cell at about two-thirds its length or a little before, rarely beyond; frontal area wanting; sheaths of ovipositor rounded at apex; last dorsal segment in ♂ with the carina, if present, not extending to the apex..... Pristiphora, Latreille.

Hind wings with the second recurrent nervure received by the first submarginal cell near its apex or almost interstitial with the second transverse cubitus; frontal area more or less defined; sheaths of ovipositor roundly truncate from below; last dorsal segment in ♂ triangularly produced..... Micronematus, Konow.

5. Front wings with four submarginal cells, or if with three only the first transverse cubitus is wanting or subobsolete.....6.

Front wings with three submarginal cells, the third transverse cubitus wanting; second recurrent nervure in hind wings usually interstitial or uniting with the cubitus a little beyond the first closed submarginal cell; frontal area more or less defined..... Euura, Newman.

(= Cryptocampus, Hartig.)

6. Middle mesothoracic lobe medially more or less depressed and *with* a distinct median grooved line or furrow; marginal cell in hind wings pointed at apex, but *with* a distinct appendage.....8.
Middle mesothoracic lobe convex, *without* a distinct median grooved line, with a more or less median carina posteriorly; if this groove is at all present, only slightly indicated anteriorly; marginal cell in hind wings pointed at apex, but *without* a distinct appendage.
Male characters.....7.
Female characters.
Antennæ rather widely separated at base, with a convex prominence between, which is margined superiorly; last dorsal abdominal segment short, rounded at apex..Pontania, Costa.
7. Last dorsal abdominal segment with a small blunt, more or less awl-shaped, projection.....Pontania, Costa.
8. Male characters.....9.
Female characters.
Frontal area more or less well defined; mesonotum and pleura shining, smooth, or at most sparsely punctate; last dorsal abdominal segment not long, squarely truncate or very slightly rounded at apex.
Last ventral segment at apex *without* a median sinus or incision.
Legs normal, the hind tarsi not thickened..Pteronus, Jurine.
Legs with the hind tibiæ and tarsi more or less thickened, the former longitudinally sulcate...Holcocnema, Konow.
Last ventral segment at apex *with* a median sinus or incision.....Nematus, Jurine.
Frontal area wanting; mesonotum and pleura opaque, with very dense and fine punctures; last dorsal abdominal segment almost as long as wide, at apex rounded or triangularly produced; last ventral segment triangularly produced..Amauronematus, Konow.
9. Last ventral segment at apex obtusely, triangularly produced or truncate.
Last dorsal abdominal segment at apex medially, *with* a rounded or truncate projection.....Pteronus, Jurine.
Last dorsal abdominal segment at apex truncate, *without* a projection.
First dorsal abdominal segment not deeply incised; terminal ventral plate only about twice as long as wide; frontal area more or less distinct.

Hind tibiæ and tarsi somewhat thickened, the former with a longitudinal sulcus . . . . . Holcocnema, Konow.

Hind tibiæ and tarsi normal . . . . . Nematus, Jurine.

First dorsal abdominal segment with a deep median incision; terminal ventral plate more than twice as long as wide; frontal area wanting . . . . . Amauronematus, Konow.

10. Hind femora and tibiæ somewhat thickened, the tarsi normal . . . . . Hypolaepus, Kirby.

Hind tibiæ towards apex and first joint of the tarsi strongly compressed and very broad . . . . . Croesus, Leach.

Family XIII.—Dineuridæ.

This group has heretofore been classified with the *Nematidæ*, but from which it is readily separated by having two marginal cells in the front wings. It appears to me, however, to be more closely allied to the *Selandriidæ*, and especially to the *Tenthredinidæ*, than to the *Nematidæ*, and probably was evolved from the latter. The basal nervure uniting with the subcostal vein some distance from the origin of the cubitus separates it from the former, while the short oviform abdomen and the venation of the front wings distinguish it from the latter.

Two subfamilies have been recognized, separated as follows:

Table of Subfamilies.

Lanceolate cell contracted near the middle, closed at base . . . . . Subfamily I., Hemichroinæ.

Lanceolate cell petiolate . . . . . Subfamily II., Dineurinæ.

Subfamily I.—Hemichroinæ.

This subfamily in having the lanceolate cell contracted at or near the middle, and in the *habitus* of the species, closely resembles the *Hoplocampinæ* in the family Selandriidæ, and suggests the possibility of its being the phylum from whence that family originated.

The genera may be recognized with the aid of the following table:

Table of Genera.

Costal transverse nervure not interstitial, placed much before the apex of the basal nervure; third submarginal cell more than twice as long as the first; claws bifid.

Second submarginal cell receiving both recurrent nervures, or the second recurrent is interstitial; first recurrent nervure in hind wings *not* twice the length of the first transverse cubitus, the anal cell longly petiolated . . . . . Hemichroa, Curtis.

Second and third submaginal cells each receiving a recurrent nervure; first recurrent nervure in hind wings more than twice the length of the first transverse cubitus, the anal cell longly petiolated.....Opisthoneura, Ashm., n. g.
(Type O. Crevecoeuri, Ashm.)

Costal transverse nervure interstitial with the apex of the basal nervure; third submarginal cell not twice as long as the first; claws simple.....Marlattia, Ashm., n. g.
(Type H. laricis, Marl.)

Subfamily II.—Dineurinæ.

The petiolated lanceolate cell readily distinguishes this subfamily from the former. In general appearance the species included in it recall those to be found in the *Blennocampinæ*, the only marked structural difference being the venation in the front wings.

Only two genera are at present known, separated by the characters made use of in the following table:

Table of Genera.

Transverse radius oblique and joining the third submarginal cell *beyond* its middle; claws of hind legs with a small, subapical tooth.....Dineura, Dahlbom.

Transverse radius straight and interstitial with the second transverse cubitus, or very nearly, the latter itself being interstitial (or nearly) with the second recurrent nervure; claws bifid.....Mesoneura, Hartig.

THE FREEZING OF INSECTS.

BY HENRY H. LYMAN, MONTREAL.

In the 22nd Report of the Entomological Society of Ontario, being that for 1891, there appeared a paper from my pen under the title "Can Insects Survive Freezing?"

I have recently come across further records of observations upon this subject, and deem them of sufficient interest to be republished in the Canadian Entomologist.

In looking over an interesting book of travels entitled "A Journey from Prince of Wales's Fort in Hudson's Bay to the Northern Ocean, undertaken by order of the Hudson's Bay Company for the discovery of

copper mines, a north-west passage, etc., in the years 1769, 1770, 1771 and 1772, by Samuel Hearne," published in 1796, I came across the following interesting notes on page 397 :

"FROGS, GRUBS, AND OTHER INSECTS.

"Frogs of various colours are numerous in those parts as far north as the latitude 61°. They always frequent the margins of lakes, ponds, rivers and swamps ; and, as the winter approaches, they burrow under the moss, at a considerable distance from the water, where they remain in a frozen state till the spring. I have frequently seen them dug up with the moss (when pitching tents in winter) frozen as hard as ice, in which state the legs are as easily broken off as a pipestem, without giving the least sensation to the animal ; but by wrapping them up in warm skins, and exposing them to slow fire, they soon recover life, and the mutilated animal gains its usual activity ; but if they are permitted to freeze again, they are past all recovery, and are never more known to come to life. The same may be said of the various species of spiders, and all the grub kind, which are very numerous in those parts. I have seen thousands of them dug up with the moss when we were pitching our tents in the winter, all of which were invariably enclosed in a thick web, which Nature teaches them to spin on those occasions ; yet they were apparently all frozen as hard as ice. The spiders, if let fall from any height on a hard substance, would rebound like a gray pea ; and all the grub kind are so hard frozen as to be as easily broken as a piece of ice of the same size ; yet, when exposed to a slow heat, even in the depth of winter, they will soon come to life, and in a short time recover their usual motions."

In Dr. H. Guard Knaggs's Lepidopterist's Guide, on page 49 of the 1871 edition, under the heading of "Ailments of Larvæ," I find the following :

"Frost Bite. It is well known that larvæ, which have been so stiffly frozen that they might have been easily broken, have afterwards recovered. The chief thing to be remembered in the treatment of such cases, is that the thawing should be effected very gradually — rapid thawing being dangerous."

NOTES ON JASSINI, WITH SOME NEW SPECIES.

BY C. F. BAKER, ALABAMA POLYTECHNIC INSTITUTE, AUBURN, ALA.

Tinobregmus vittatus, VanD.—This species occurs from Virginia to Brownsville, Texas, where it is frequent. The male differs most remarkably from the female. It is smaller and the elytra equal the abdomen in length. In the male the head and all below, with bases of femora, hind tibiæ entirely and tips of elytra are black; the pronotum and elytra except tips are milky white. The hind tibiæ equal the whole body in length.

Neocoelidea, G. & B.—The description of this genus requires amending somewhat, on account of the discovery of a number of new species evidently congeneric with *tumidifrons*, and in consequence of a study of a large series of specimens of the type species. The anteapical cell in the wing is a monstrosity; there are two apical cells besides the costal or supernumerary, the first sometimes peduncled. All of the species are not as robust as *tumidifrons* and *lactipennis*, but resemble Thamnotettix in form, having longer elytra. The elytra always lack a distinct appendix and sometimes possess but three well-defined apical cells. VanDuzee's *Jassus lactipennis* belongs in this genus. *Tumidifrons* is found also in Texas.

Neocoelidea lineata, n. sp.—Female. Length 7 mm. Vertex broadly obtusely rounded. Colour pale greenish-yellow. Apex of vertex with a small black spot; the disc with a median longitudinal darkened area which extends across the pronotum, becoming gradually broader posteriorly and forking on the scutel. Elytra subhyaline, slightly obscured, somewhat darker along the internal border and at apex. Veins of wings except second sector strong and dark. Tergum with a longitudinal black band narrowing to a point behind and visible through the closed elytra. Ovipositor rufous. Last ventral segment very long and truncate or more or less sinuate behind, and slightly notched at centre.

Male.—Length 5.5 mm. Colour orange yellow. Length of valves twice entire breadth at base, alternate and parallel-sided beyond middle.

Prof. A. P. Morse collected this species in abundance at Ashland, Oreg., Sept. 7th. There were in the lot but few males to many females.

Neocoelidea obscura, n. sp.—Female. Length 5.5 mm. Proportionally rather broad across base of elytra. Vertex obtusely rounded. Straw coloured; apex of vertex with a small black spot. Elytra nearly hyaline. Tergum with a subobsolete trace of black at base. Vertex, pronotum and scutel with faint traces of two parallel light lines, which are very

faintly edged with reddish. Veins of wings, except second sector, very distinct and brownish. Last ventral segment very long, white, hind margin evenly rounded.

Male.—Length 5.5 mm. While slightly shorter, the male is not narrower, and this makes it appear more robust than the female. The reddish borders are more prominent, and the veins of the elytra are conspicuously brown, the latter being a very rare character in this genus. The valves are once and a half as long as wide at base, the sides evenly oblique to the acute tip, scarcely incurved.

There are several females in my collection from Prescott, Ariz. (Kunzé), and in the National Museum a male from Texas, and a female from Marble Valley, Cal. (Koebele).

Neocoelidea rubrolineata, n. sp.—Size and form of *obscura*, to which it is closely related. The two parallel white lines on the vertex, pronotum and scutel, are very distinct. Vertex obtuse, but rather strongly produced, its apex without a black spot. Colour above shading into reddish on the vertex, where it contrasts strongly with the white lines, giving the vertex the appearance of being rubrolineate. Inner margin of elytra somewhat darker. Wings with all the veins whitish.

Male.—Slightly smaller than the female, and brighter coloured. Valves large, long, parallel-sided, tumid, and apex bluntly rounded.

Described from one male and five females in the Herbert H. Smith collection, taken at Corumba and Chapada, Brazil, in March, April, May.

Neocoelidea pallida, n. sp.—Female. Length 5 mm. Vertex strongly produced and subacute. Colour very pale faded yellowish throughout, the elytra subhyaline. Veins of wings, except second sector basally, distinct and brownish. Last ventral segment long, subtruncate. Male somewhat smaller, valves as in *lineata*.

This species was abundant near Tucson, Ariz., in May and June (Kunzé). Prof. Morse also found it at Palm Springs, Cal., on July 12th. This small weak form seems to be common in the South-west. It has a singular lack of salient characters. It can be readily separated from the other species by its size, lack of markings, and form of vertex.

Neocoelidea modesta, n. sp.—Female. Length 7 mm. Large and robust, but with the usual elongate elytra. Pale sordid yellowish throughout, the elytra subhyaline, the vertex with a small black spot at apex. The last ventral segment is twice the length of the preceding, and very broadly notched to half its length.

Described from three females in the Herbert H. Smith collection, taken at Chapada, Brazil, in June and August.

Neocoelidea Barretti, n. sp.—Female. Length 6 mm. Vertex moderately produced, obtuse. Colour pale lemon-yellow. Tip of vertex with a small black spot; from this, extending backward to the tip of the clavus, is a conspicuous longitudinal brown band; the sides of this band are darker, and incurved twice on the vertex, once on the pronotum, once on the scutel, and twice on the clavus; it terminates in a brown spot on either side just beyond tip of clavus. Scutel with a black spot on either side of the centre. Elytra subhyaline, slightly smoky within at tip. Wings milky white, with a median longitudinal fuliginous band. Tergum with a median longitudinal black band.

Male somewhat smaller and more strongly coloured, the valves as in *lineata*.

Described from several specimens collected near Vera Cruz, Mexico. Named in honour of Mr. O. W. Barrett, a collector who shows promise of doing something noteworthy on the Mexican fauna. This is the most striking North American species of the genus.

Neocoelidea bimaculata, n. sp.—Female. Length 6.5 mm. With the colour and very much the general appearance of *modesta*, but smaller, slenderer, and with two brown commissural spots on clavus, one at base, the other at tip. The vertex is proportionately more produced. Last ventral segment somewhat longer than preceding, depressed either side of median line, the hind margin slightly produced and minutely notched at middle.

Male slightly smaller, the valves rather large and long, gradually evenly narrowed to obtuse points.

Described from a male and female in the Herbert H. Smith collection, taken at Chapada, Brazil, in August.

Neocoelidea Smithii, n. sp.—Female. Length 8 mm. Pale yellowish with faint touches of reddish on sides of front, pronotum, scutel, and along commissural margin of clavus. Elytra shining yellowish, subhyaline, with four dark spots on inner margin, three on clavus and one beyond; with a complete transverse decoloured band before transverse nervures, which is edged before near costa with a dash of red; with another partial decoloured band beyond transverse nervures which is edged near costa with fuliginous. Costal margin of elytra and first sector of wings greenish. Wing subhyaline, with a median row of three fuliginous spots; veins pale

brown, excepting first sector. Last ventral segment but little longer than preceding, hind margin truncate, with the lateral angles somewhat produced.

Described from a single specimen from Brazil in the Herbert H. Smith collection. It is the largest and finest known species in the genus. It is most nearly related to *gratiosus*, Spang., which is also an undoubted *Neocoelidea*.

Paracoelidea, n. gen.—With the venation and other characters of *Neocoelidea*, but with the clypeus strongly and very conspicuously tuberculate. This is a character unique in the tribe *Jassini* and very rare in the subfamily Jassinæ. The elytra are elongate as in *Thamnotettix*. Type, *Paracoelidea tuberculata*, n. sp.

Paracoelidea tuberculata, n. sp.—Female. Length 5 mm. Vertex rather strongly produced and subacute, as in *Neocoelidea pallida*. Colour pale yellowish. The elytra subhyaline and faintly yellowish, with the internal margin and apex slightly infuscate. Tergum medially black. Wing with the third sector and its forks strongly brown, the other veins pale. Last ventral segment twice length of preceding, hind margin truncate.

Male somewhat more highly coloured. The valves are about twice as long as entire breadth at base, tapering to obtuse tips, sides rounded below, somewhat constricted at two-thirds of length.

Described from several specimens from New Bedford, Mass. (Hough), several from Washington, D. C. (Coquillett), a number from the vicinity of Baltimore taken on pine (Uhler), and one female collected by myself at Auburn, Ala.

Terulia magna, n. sp.—Female. Length 14 mm, breadth across base of elytra 5 mm. Ocelli equidistant from eyes and median line. Front with a fine, sharp median carina. Clypeus with a narrow median callosity and with apex somewhat emarginate. Clavus without transverse nervures. Colour ferruginous throughout, including the subcoriaceous elytra; front a little lighter, vertex darker before tip. The strong carina on propleura, and some indistinct markings on fore and middle legs, reddish. Hind legs lineate with black. Last ventral segment depressed on either side of a strong median ridge, the hind margin acutely produced medially, then broadly incurved to the prominent lateral angles.

Described from a single female in the Herbert H. Smith collection, taken at Para, Brazil, in July. This species is nearest *ferruginea* (Stal.), but differs in size and various minor characters. It is the largest described species in the genus.

Petalopoda annulipes (Spang) —There is a specimen of this curious Jassid in the Herbert H. Smith collection, taken at Santarem, Brazil.

TWO NEW SPECIES OF LECANIUM FROM CANADA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Lecanium (Eulecanium) caryarum, n sp.—♀. Scale (after producing young) somewhat variable in form, from long. 6, lat. 3½, alt. 2⅔ mm., to long. 5½, lat. 4⅓, alt. 3¼ mm., the more swollen individuals probably affected by parasites; outline in transverse section nearly hemispherical, in longitudinal section more or less low-pyramidal, with the posterior slope considerably the shortest, the apex of the pyramid marked by a more or less prominent boss, sometimes inclined to be double. Colour of scale dark chestnut; sides pitted and plicate to a variable degree.

Antennæ rather unusually long and slender, about 348 $\mu\mu$ long; formula 37 (12) 465; 3 is about 83 $\mu\mu$ long, 7 about 50 $\mu\mu$; 1 with two short bristles, 2 with two long bristles near the end, 4 with a very long bristle, 5 and 6 each with a rather short bristle, 7 with two whorls of rather short bristles.

Tarsus about ⅔ length of tibia; tibia 116 $\mu\mu$ long, tarsus (without claw) about 74 $\mu\mu$. Digitules long; thorax of claw extending far beyond its tip, one a little shorter and stouter than the other. Length of anal plates about 150 $\mu\mu$. Width of mouth-parts about 166 $\mu\mu$.

Hab.—Very abundant on twigs and branches of a magnificent tree of *Carya alba*, on the grounds of Mr. C. Thonger, at Niagara, Ontario, June 17th, 1898 (J. Fletcher).

There is an unfortunate confusion about Fitch's *L. caryæ*. The original description, published in 1856, is as follows: "Large, very convex, oval, black fading to chestnut brown, in May dusted over with a white powder." Long. 0.40, lat. 0.25 inch. This agrees tolerably well in some respects with a species found by Mr. King, which will be described in a future paper.

Signoret, however, describes a quite different *L. caryæ*, based on specimens sent to him as that species by Fitch. This is only 6 mm. long, and has 6-jointed antennæ. It is closely allied in all respects to the European *L. corni*. What I take to be this species was found by Mr. G. B. King, at Methuer, Mass., on *Gleditschia*. This *Gleditschia* insect, however, agrees even better with Signoret's account of *L. cynosbati*, Fitch, and my present opinion is that *cynosbati*, Fitch, and *caryæ*, Sign. (not Fitch, 1856), are one species.

L. caryæ, var. *canadense*, Ckll, must stand as *L. canadense*. *L. caryarum*, above described, is well distinguished from all these species, especially by its antennæ.

Lecanium (Eulecanium) maclurarum, n sp.—♀. Scale long. 4½, lat. 3, alt. 3 mm., very dark chestnut brown, shiny, smooth dorsally, pitted round the margin; in transverse section narrower than a half circle, in longitudinal section with the outline of a half circle, except that the margin is produced caudally.

Antennæ shorter than in *caryarum*, about as long as in *cynosbati*, 7-jointed, formula 3 (17) 25 (46). Sometimes the antennæ seem only 6-jointed, with a formula 3162 (45). In the normal (7-jointed) antennæ, 3 is about 62 $\mu\mu$ long, while 4 is less than half that length; 1 is about 42 $\mu\mu$ long, 7 the same.

Tibia 113 to 121 $\mu\mu$ long, tarsus (without claw) 85 to 90 $\mu\mu$, claw 23 $\mu\mu$. Claw digitules rather slender, extending considerably beyond its tip. Skin reticulated as usual in the subgenus.

Hab.—On twigs of osage orange, Niagara, Ontario, June 17, 1898 (J. Fletcher).

This scale has some considerable resemblance to *L. corylifex*, Fitch, which Mr. G. B. King has lately found at Lawrence, Methuen and Andover, Mass., on *Corylus americana*.

I will take this opportunity to record that I have just received *L. quercitronis*, Fitch, from two new localities, on new food-plants, viz, (1) on elm, DuBois, Ill. *(Chas. C. Adams)*, (2) on *Castanea pumila*, on the road to and near the Yosemite Valley, Mariposa Co., Calif. *(Alex. Craw)*.

TÆNIOCAMPA ALIA, Gn., AT QUEBEC.

BY REV. THOMAS W. FYLES.

Fifty-nine eggs of this species were found on a twig of *Amelanchier Canadensis*, at the "Gomin," June 1st, 1897. They were laid in four rows—each row was about three-fourths of an inch long.

Egg.—Small, dull pink in colour, striated. The ridges branch into pairs a short distance from the apex, and number altogether about 33. Each ridge is regularly indented, so as somewhat to resemble a cord. Hatched in the afternoon of June 5th.

Young larva.—A half-looper. Length one-tenth of an inch. Colour greenish-yellow. Set thickly with brown warts, and sparsely with bristles,

Head large. Two hindmost pairs of pro-legs and the claspers very long. Moulted June 10th.

Larva after first moult.—Length two-tenths of an inch. Colour green. Dorsal line white; sub-dorsal white, with a chocolate line close below it. A second chocolate line below that. Side line white. On the segment next the head is a whorl of black dots, with a black bristle surmounting each dot. There is a similar whorl on the following segment. On each of the other segments there are along the back two pairs of black dots—the first pair nearer together than the second. Head ochreous. Feet green. Moulted June 15th.

Larva after second moult.—Length four-tenths of an inch. Head ochreous. Body colour dull green. Dorsal and sub-dorsal lines greenish-white. Spiracular line milk white, and broad. Between the sub-dorsal and spiracular lines the colour is brownish-green. Spiracles black. Moulted June 23rd.

Larva after third moult.—Length one inch. Head chestnut. Body colour brown. Dorsal, sub-dorsal and side lines interrupted, bluish, bordered with dark brown. Spiracular line milk white. Spiracles black. On either side of the dorsal line, on each segment, is a pale spot. Moulted June 28th.

Full-grown larva—Length one inch and a half to one inch and three-quarters. Plump; dull brown, rather mottled, lighter on the back. Dorsal, sub-dorsal and side lines somewhat interrupted; ochreous, edged with dark brown. Spiracular line dirty white. Spiracles black. Head light chestnut, with a brown spot on each side. Buried itself July 4th. Formed a cist with a slight web.

Chrysalis.—Rich mahogany brown.

Imago.—Somewhat variable in colour. The following is a description of the prevailing type: Expanse of wings, one and a half inches; length of body, seven-tenths of an inch; length of antennæ, nine-twentieths of an inch. Antennæ filiform. Colour of primaries, brownish-ash, with a gloss; fringe reddish. Along the subterminal line to within a short distance of the costa is a row of dark brown velvety spots. Reniform and orbicular stigmata dull brown, outlined with Indian-red. Inner line wavy; this and the elbowed line are Indian-red. The central shade is reddish-brown. On the basal half of the wing are some short, curved, Indian-red markings. On either side of the subterminal line is a row of small, but distinct, brown dots. Secondaries gray. The moths appeared in early spring.

BOOK NOTICES.

OUTDOOR STUDIES: a Reading Book of Nature Study.—By James G. Needham; 1 Vol., pp. 90. New York, Cincinnati, Chicago: American Book Company.

These are a series of stories of animal life, written in a charmingly interesting way, and designed to lead on a youthful reader to observe for himself the wonders of nature that are everywhere open to his view. It begins with an account of the common wild snapdragon, or "butter and eggs," and tells how the peculiar structure of the flower is designed for the visits of the bumblebees who come for the nectar and carry off the pollen as well. The next chapters are on Chipmunks; Galls and their makers; the Golden-rod and its visitors and tenants; Crows and their doings; Dragon-flies, which, as our readers may remember, have been special objects of the author's studies; Eye-spots on insects which aid in the protection of their owners; and Ant-lions. Any boy or girl who takes up the book and dives a little way into its pages will surely read on with delight, and when the little volume is closed, be anxious to sally forth and see if he (or she) cannot find some similar marvels of nature and learn their meaning while admiring their beauty.

The book is one of a series designed for the use of school children who are about to enter the high schools. It is beautifully illustrated with about ninety wood-cuts, the work of Mrs. Needham, the author's wife, and is provided with an index and a list of the scientific names of the animals and plants referred to in the text.

LEPIDOPTERA, RHOPALOCERES AND HETEROCERES, indigenous and exotic. Supplement No. 1. By Herman Strecker. (Printed for the author), Reading, Pa., 1898. 12 pp., 4to. Price, 25 cents.

It is now twenty-one years since Mr. Strecker published the last number of the above-named work; it was, therefore, an agreeable surprise to receive the first part of a new issue with the old familiar title page. This "Supplement No. 1" contains descriptions of fifty-one species of Heterocera, which have all, with one exception—a species from Brazil—been taken in North America; two-thirds of them are described from single examples. The author states in his preface that he found, on rearranging his collection of Noctuidæ, that he had a number of specimens which he was unable to identify, "either through the bibliography, or the examination of other collections, or by the aid of specialists," and consequently he took the matter in his own hands and issued this instalment of new descriptions. He explains also the difficulties that he met with in his endeavor to give figures of the species thus described, and how he was compelled to do without them. We certainly miss them very much, but as we are never likely to possess duplicates of anything that is unique in Mr. Strecker's collection, the want of them is not so serious. Under these circumstances it seems a pity that Mr. Strecker had not sent his descriptions to some entomological journal, such as the Transactions Am. Ent. Society, rather than to have published them in this form himself.

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ENTOMOLOGICAL SOCIETY OF ONTARIO.

The thirty-fifth annual meeting of the Society was held in Montreal on the 8th and 9th of November, in order that the members might join in the celebration of the twenty-fifth anniversary of the foundation of the Montreal Branch. A full account of the business transacted and the papers read will be published in the annual report of the Society. A very enjoyable conversazione was held in the rooms of the Natural History Museum in the evening of the 8th. Short addresses on the history and progress of the Society were made by Mr. Lyman (the President), Dr. Fletcher, and the Rev. Drs. Bethune and Fyles. A large number of microscopes, with slides of an entomological character, were furnished by the Microscopical Society, and a splendid display of specimens, chiefly Lepidoptera, was made by the members of the Montreal Branch.

The following were elected officers for the ensuing year :

President.—Henry H. Lyman, M. A., Montreal.

Vice-President.—Rev. T. W. Fyles, D. C. L., F. L. S., South Quebec.

Secretary.—W. E. Saunders, London.

Treasurer.—J. A Balkwill, London.

Directors.—Division No. 1—W. H. Harrington, F. R. S. C., Ottawa ; Division No. 2—J. D. Evans, Trenton ; Division No. 3—Arthur Gibson, Toronto ; Division No. 4—A. H. Kilman, Ridgeway ; Division No. 5—R. W. Rennie, London.

Directors Ex-officio (ex-Presidents of the Society).—Professor Wm. Saunders, LL. D., F. R. S. C., F. L. S., Director of the Experimental Farms, Ottawa ; Rev. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., Headmaster of Trinity College School, Port Hope ; James Fletcher, LL. D., F. R. S. C., F. L. S , Entomologist and Botanist, Experimental Farms, Ottawa ; John Dearness, I. P. S., London.

Director Ex-officio (Ontario Agricultural College).—Professor Wm. Lochhead, Guelph.

Librarian and Curator.—J. Alston Moffat, London.

Auditors.—J. H. Bowman and W. H. Hamilton, London.

Editor of the Canadian Entomologist.—Rev. Dr. Bethune, Port Hope.

Editing Committee.—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; W. H. Harrington, Ottawa; James White, Snelgrove.

Delegate to the Royal Society.—Rev. Dr. Fyles, South Quebec.

Delegates to the Western Fair.—J. Dearness and W. E. Saunders, London.

Committee on Field Days.—Dr. Woolverton, Messrs. Balkwill, Bowman, Elliott, Law, Percival, Rennie, Saunders, and Spencer, London; Dr. Hotson, Parkhill.

Library and Rooms Committee.—Messrs. Balkwill, Bethune, Dearness, Moffat, and Saunders.

NOTES ON SOME ALBERTA BUTTERFLIES.

BY F. H. WOLLEY DOD, CALGARY, ALBERTA.

Chionobas.—To hear of the occurrence of Chionobas *Macounii* in the hill-prairie district south of Calgary* will doubtless be as much of a surprise to most entomologists as the discovery of it here has been to myself. That a man who, like myself, is ever on the outlook for anything fresh in the way of butterflies, should have lived for five years in a *Macounii* locality without knowing it surpasses my comprehension. Whilst overhauling, relaxing, and setting last winter from the captures of the past two seasons, I came across, amongst some papered specimens that had been handed to me by a Mr. Hudson, an ardent collector here, a papered butterfly labelled "*Chionobas Chryxus*, ♀, July 4th, 1896," taken amongst the spruce about twelve miles west of here; that is to say, about 26 miles to the south-west of Calgary. Now, though I have never yet seen *Chryxus* here, I have always been expecting to come across it amongst the spruce, and was not much surprised. However, after relaxing and setting the specimen, lo and behold! it was not *Chryxus*, but agreed rather closely with some *C. californica* ♂♂ that I have from Ft. Klamoth, Oregon. Having learnt from Mr. Elwes's "Revision of Œneis" that a supposed *Macounii* ♀ had been taken by Prof. Macoun

* A fine male of this species taken at Red Deer, N.-W. T., by Mr. T. N. Willing, of Olds, Alta., was shown at the annual meeting of the Entomological Society of Ontario in 1895.

at Morley*, Alta., my suspicions were aroused, as the locality where Mr. Hudson took the specimen is very like the Morley district, viz., thick spruce and pine timber. To make sure whether the species was *Macounii* or not, of course, needed a ♂, so I determined to visit the locality this season and work specially for it. On June 18th of this year Mr. Hudson brought me a fine ♂ of the same species that he had just captured about a mile west of my place (*i. e.*, about ten miles east of the eastern limit of the spruce here), and which, from its resemblance in size and colour to my Oregon *Californica*, except for the absence of sex mark, I had not the slightest doubt was *Macounii* from the moment I saw it. I am generally too busy with other matters to devote more than one day in the week to butterfly catching, and as the spruce district is a far better hunting-ground for various species than the more immediate neighborhood, it is thither that about once a week I generally wend my way. Accordingly, on June 19th, Mr. Hudson and myself visited last year's locality together, and succeeded in capturing, amongst other species, one fine ♂ *Macounii* flying in the thick timber in company with *Jutta*. On 26th we took two ♂ ♂ and two ♀ ♀ in the same locality, and saw about two more, and noted the fact that it is less partial to the thick spruce than *Jutta*, as three of the four specimens were taken outside the spruce, one several hundred yards from it, whilst *Jutta*, though common under cover of the woods, is seldom seen outside. The capture by myself on July 4th of a ♀ in fair condition, on the hill-prairie about two miles east of where Mr. Hudson first took it this year, brings me to believe that it must be somewhat widely distributed, though it is certainly far from common. Up to date we have turned up nine specimens in all, and only seen about two more. I can recognize it on the wing at a glance, and its flight being slow and somewhat clumsy, it is very easy to net on open ground. Three of the four specimens which I caught myself near the spruce, I disturbed from dead boughs lying on the ground. One of these I followed—I cannot say chased — laboriously over fallen timber for about a hundred yards, the butterfly every now and then settling on a log, and resting with closed wings and a tilt to one side at an angle of about 45° to the log. It allowed me every time to come almost within striking distance before it took wing again, and had the nature of the ground permitted me to run a yard it would never have settled twice after I had first seen it. After one

* There is no doubt as to the identity of the specimens taken at Morley and referred to by Mr. Elwes. There were two males and one female. These were taken by Mr. W. T. Macoun, and were exhibited by Dr. Fletcher at one of our annual meetings.

or two stalkings, it flew when rising, apparently from clumsiness, towards me instead of away, and thus ended its career. The specimen I took on the prairie I observed settle on a flower-head—of what species I know not—a habit I have never yet observed in either *Jutta*, *Alberta* or *Varuna*. The ♂ ♂ agree fairly well with my *Californica*, except that both primaries and secondaries are broader and more rounded, the sex marks absent, and the primaries have two ocelli, rarely a trace of a third, whereas my *Californica* have only one; and the ground colour of the under side of secondaries is paler, and the band more contrasting. My only explanation of the fact that I have not met with it here before this year, is that it must be very erratic in appearance, as so conspicuous a butterfly is not easily overlooked. I should be glad to hear something about it from those who have taken it at Nepigon.

A NEW PLANT LOUSE ON TOBACCO.

BY THEODORE PERGANDE, WASHINGTON, D. C.

Dr. L. O. Howard, who is preparing a general article on the subject of insects affecting tobacco, for the Year Book of the U. S. Department of Agriculture for 1898, has called my attention to a plant louse feeding upon tobacco plants grown on the grounds of the Department, which he wishes to mention specifically in his article, and since it is a new species, at his request, I submit for publication the following description.

I had been familiar with this undescribed species since 1897, and had found it on the grounds of the Department of Agriculture in smaller colonies on *Rumex crispus*, *Leucanthemum vulgare*, *Forsythia viridissima*, and also on the leaves of the apple, pear, and egg-plant. Specimens have also been received from Mt. Holly, Md., where they were reported to feed in immense numbers on the tomato plant.

NECTAROPHORA TABACI, new species.

Winged Viviparous Female.—Length of body, 2.8 mm. to 3 mm.; expanse of wings, about 8 mm.; length of antennæ, 3 to 4 mm. Colour yellowish-green and faintly pruinous, with the median line and lateral margins of the abdomen more or less distinctly darker. Head, thoracic lobes and sternal plate light brownish and polished; the anterior angle of the median lobe and posterior angle of the scutellum frequently black. Eyes brown; ocelli colourless, margined at inner side with black. Antennæ black, reaching considerably beyond the tip of the tail, the two basal joints pale, dusky or with a greenish tinge, extreme base of third

joint pale greenish. Legs rather long and slender; femora pale greenish at base, shading gradually from brown to black at the apex; coxæ pale greenish; tibiæ dark yellowish, their apex and the tarsi black. Nectaries long and slender, slightly stoutest at base, about two-thirds the length of the femora, reaching beyond the tip of the tail, and of a black colour, with their basal fourth or less, pale greenish. Tail about one-fourth the length of the nectaries, curved upwards, densely covered with minute spines, and provided with a few rather long and fine hairs along the edges; green, changing gradually to dusky towards the end. Rostrum short, not reaching to the median coxæ, pale dirty yellowish, the last two joints brown or black. Wings transparent, iridescent; the subcosta faintly yellowish or greenish, its base more or less distinctly yellow; stigma pale greenish, and with a pale dusky shading along the outer and inner margin; costa and veins slender and black.

The antennæ are apparently without any sensoria, but are provided with a few short and capitate sensorial hairs; those of the tibiæ are quite numerous and slightly enlarged at the tip.

Apterous Female.—Length, 4 to 4.4 mm. to the tip of the tail. Coloration as in the winged form, though more distinctly pruinous; head yellowish; coxæ and femora pale bluish-green, their apex black; tail pale green or frequently yellowish. Hairs of antennæ and legs as in the winged form. The larvæ, and especially the pupæ, are distinctly pruinous, giving to them a whitish appearance in a certain light. The younger larvæ are yellowish, with antennal joints three and four white, tipped with black. Pupæ pale yellowish-green, head and thorax pale greenish, the wing-pads almost white, and with a dusky streak near inner edge; coloration of antennæ as in the larvæ; femora very pale greenish, the tibiæ pale yellowish, with the apex black.

THE HESSIAN FLY ATTACKING TIMOTHY.

When examining some stems of timothy grass taken from a wheat field in Prince Edward Island, where this year's crop had been badly infested with Hessian Fly, I found two of the stems of timothy which bore the undoubted flax-seed-like puparia of the Hessian Fly. There was only a single puparium on each stem, and these were at the second joint from the root, lying inside the sheathing base of the leaf close above the knot. The Hessian Fly is recorded as attacking timothy in Russia, but I do not recall any record of similar work in America.

J. Fletcher, Ottawa.

SOME NEW NEMATIDS.

BY C. L. MARLATT, WASHINGTON, D. C.

PONTANIA CONSORS, new species.

Larva and Galls.—Dyar, Jour. N. Y. Ent. Soc., VI., June, 1898, p. 121.

Female.—Length, 4.5–5. mm.; slender; surface shining, not at all pubescent; clypeus distinctly emarginate, lobes triangular; ocellar basin distinctly defined, but with walls rounded; crest rather sharp, unbroken; fovea oval, distinctly defined; antennæ short, joints 3 and 4 subequal; sheath moderately broad, regularly rounded at tip; clothed with a rather dense fringe of long browish hairs; cerci narrow and elongate; claws deeply cleft, rays subequal; venation normal, upper discal cell of hind wings elongate, as long as or exceeding lower. Colour black; orbits and face brownish-yellow, including the area between the bases of the antennæ; pronotum, tegulæ and legs for the most part and venter of abdomen yellowish or resinous; bases of coxæ black; posterior tarsi strongly infuscated; sheath dark brown; apical half of abdomen, dorsally, resinous, more or less infuscated; veins and stigma dark brown or strongly infuscated; wings hyaline, or nearly so.

Male.—Length, 4.5 mm.; structural characters in general as in female; antennæ rather more robust, short, scarcely as long as head and thorax; upper discal cell of hind wings distinctly elongate and exceeding lower cell in length. Colour in general as in female; wing veins darker, almost black, and dorsum of abdomen altogether black; procidentia not longer than wide.

Described from one female and two males reared by Mr. Dyar from willow galls on *Salix sericea*. In the table of the genus given in my Revision of the Nematinæ (Bull. 3, Tech. Ser., Div. Ent. U. S. Dept.) the female of this species would fall next to *pisum*, Walsh, from which *consors* is readily distinguished by having a somewhat elongate third cubital cell, and by the elongate upper discal cell in the hind wings. The male of this species falls in the table next to *pomum*, from which it is readily separated by the long upper discal cell in *consors* much exceeding lower cell.

PONTANIA BOREALIS, new species.

Larva and Galls.—Dyar, Journ. N. Y. Ent. Soc, VI., June, 1898, p. 121.

Female.—Length, 4 mm.; rather slender, glistening; body clothed with minute yellowish hairs, particularly evident on thorax; clypeus deeply emarginate; ridges about anterior ocellus rounded, nearly obsolete;

frontal crest well developed, not broken ; fovea minute, oval ; antennæ stout, much shorter than head and thorax ; joints subequal ; sheath narrow, elongate, regularly tapering or slightly excavated beneath, clothed with short black hairs ; cerci long and narrow and not extending to the tip of sheath ; claws evenly notched or nearly so ; upper middle cell of hind wings projecting one-third its length beyond lower cell ; venation otherwise normal. Colour black ; narrow inner orbits and cheeks resinous, strongly infuscate ; spot between bases of antennæ ; mouth-parts generally, pronotum, tegulæ, legs for the most part, and the central area of venter of abdomen resinous infuscate ; bases of coxæ darker, and tarsi, especially posterior pair, more strongly infuscate than the rest of the legs ; sheath edged with black ; veins brown ; stigma and costa distinctly infuscate ; general surface of wings somewhat infuscate.

Described from two females reared by Mr. Dyar from galls on *Salix sericea*. The species is allied to *P. californica*.

Type No. 3859, U. S. N. M.

PTERONUS CARPINI, new species.

Larva.—Dyar, Journ. N. Y. Ent. Soc., VI., June, 1898, p. 121.

Female.—Length, 6 mm. ; rather robust, shining ; clypeus very broadly and shallowly emarginate, nearly truncate ; vertex roughened with coarse punctures ; ocellar basin distinctly defined, with prominent walls ; crest strongly bent anteriorly, scarcely broken centrally ; fovea triangular, deep, with sharp limiting ridges ; antennæ long, very strongly tapering, joints 3 and 4 subequal, 5 scarcely shorter ; sheath short, rounded at tip, slightly emarginate beneath, clothed with dark brownish hairs ; claws deeply notched, rays subequal ; venation normal, upper cell of hind wings slightly exceeding the lower cell, stigma very robust. Colour black ; small triangle below the antennal fovea, the clypeus and other mouth-parts, pronotum, tegulæ, legs for the most part, large sternal spot, and the venter of the abdomen light resinous yellow ; posterior legs with the tips of their femora and tips of tibiæ and all the tarsi black ; edge of the abdomen dorsally and a central line, interrupted on the first and last segments, yellow ; wings hyaline, veins and stigma dark brown.

Described from a specimen reared by Mr. Dyar from gregarious larvæ on "ironwood," either *Ostrya virginica* or *Carpinus carolina;* taken at Fort Lee, N. J., in September. In the table of species (l. c., p. 45) *P. carpini* will follow *P. thoracicus*.

Type No. 3859, U. S. N. M.

PTERONUS QUERCUS, Marlatt.

Male.—Length, 4.5 mm. ; rather robust ; structurally as in the female except that the intercostal nervure is not interstitial (nor is it quite so in the companion female) ; procidentia inconspicuous. Colour as in female,

except that the antennæ are light yellowish beneath, much more distinctly so than in the case of the other sex.

The female of this species was described in my Revision of the Nematinæ of North America (Bulletin No. 3, technical series, U. S. Dept. Agr., Div. Ent., p. 67, No. 35), from a specimen bred March 22nd, from an oak larva taken at Ithaca, N. Y., by Mr. Trelease. Mr. Dyar has handed me two specimens, a male and female, reared from solitary larvæ taken at Brook Haven, L. I., resting on the edges of the leaves of *Quercus alba*, the adults issuing April 15th, 1898. Opportunity is now taken to characterize the male insect.

Type No. 3860, U. S. N. M.

NEMATUS CHLOREUS, Norton.

Male.—Length, 4 mm.; moderately robust and shining; clypeus distinctly and broadly emarginate, lateral lobes small, sharp pointed; vertex smooth, with the walls of ocellar basin indistinct or subobsolete, and the frontal crest scarcely raised; fovea semicircular, distinctly defined; antennæ short, robust, joint 3 slightly larger than joints 4 and 5; procidentia short, scarcely projecting; claws deeply notched; venation normal. Colour in general black; face, beginning with the frontal crest and including the cheeks and orbits (interrupted opposite ocelli), pallid; pronotum, tegulæ and venter for the most part, light resinous, inclined to reddish yellow; line across the middle and the upper and posterior edge of meso-epimera black; base of posterior coxæ black; tarsi, especially posterior pair, slightly infuscated; wings hyaline; veins light brown; costa and stigma yellowish, nearly hyaline.

The female of this insect was described in my Revision of the Nematinæ of North America (l. c., p. 90), from two specimens collected in Texas. Mr. Dyar has recently reared a male and female of this species from solitary edge-feeding larvæ taken on black oak (*Quercus coccinea*) at Bellport, L. I., and the male is now characterized. (See description of larva, Journ. N. Y. Ent. Soc., Vol. VI., June, 1898, p. 123.)

Type No. 3861, U. S. N. M.

Papilio brevicauda, Saunders.—This rare butterfly, which has hitherto only been recorded from Newfoundland, Anticosti, Labrador, Gaspè, and a few other localities on the Bay of Chaleur, has now been found at Kamouraska, a village about eighty-five miles below Quebec, by Mr. A. F. Winn, of Montreal. He found the larvæ feeding upon the leaves of Archangelica, and also obtained eggs from the female butterflies. The insect has now been carried through all its stages, as related by Mr. Winn in the paper he read at the annual meeting of the Entomological Society of Ontario in Montreal. This paper will be published in the forthcoming Annual Report.

CLASSIFICATION OF THE HORNTAILS AND SAWFLIES, OR THE SUB-ORDER PHYTOPHAGA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 7.—Conclusion.)

FAMILY XIV.—TENTHREDINIDÆ.

This family is probably the most extensive of any of the families of the sawflies, and is of world-wide distribution, representatives of it being found in all parts of the world, although, as a whole, it is more numerously represented in the Palearctic and Neotropical regions than elsewhere.

I have separated the family into four subfamilies, distinguishable by characters made use of in the following table :

Table of Subfamilies.

Lanceolate cell contracted before the middle, but still *open*, the contracted part not quite extending to or uniting with the submedian vein, and with or without an oblique or straight cross-nervure beyond the middle.

Front wings with *three* submarginal cells.

Third transverse cubitus wanting, the first and second submarginal cells each receiving a recurrent nervure.....Subfamily I., Athlophorinæ.

Second transverse cubitus wanting, the second submarginal cell therefore large and receiving both recurrent nervures.....Subfamily II., Dolerinæ.

First transverse cubitus wanting, the first and third submarginal cells each receiving a recurrent nervure.....Subfamily III., Strongylogasterinæ (pars).

Front wings with *four* submarginal cells, the second and third each receiving a recurrent nervure..Subfamily III., Strongylogasterinæ.

Lanceolate cell with a straight or oblique cross-nervure at or a little before the middle ; if contracted, *closed*, the contracted part extending to and uniting with the submedian vein ; front wings with four submarginal cells.....Subfamily IV., Tenthredininæ.

Subfamily I.—ATHLOPHORINÆ.

This subfamily is based upon the genus *Athlophorus*, Burmeister, described in 1847, from Java. It is unknown to me in nature, but is

so admirably described and figured by Burmeister, that I have no hesitancy in considering it a distinct group near the *Dolerinæ*.

The venation of the front wings is quite different from the other subfamilies, in lacking the third transverse cubital nervure and in the shape of the mandibles.

This group is evidently peculiar to the Oriental region, and we may naturally expect the discovery of other genera in it when the sawflies of that region are more extensively collected, since at present our knowledge of them is most meagre.

The single genus known may be briefly characterized as follows :

Hind wings without a closed discal cell, the anal cell a little shorter than the submedian ; right mandible simple, acute ; left mandible acute at apex, but with an incision or tooth at the middle within ; claws cleft.....Athlophorus, Burmeister.

Subfamily II.—Dolerinæ.

This subfamily was first separated as a tribe by S. C. Thomson, in 1871, with one genus, *Dolerus*, Jurine, established in 1807. Pastor Konow, however, in 1890, separated this genus into two distinct genera, based upon the shape of the eyes and the length of the malar space. An examination of a large series of species of *Dolerus* shows that these characters are scarcely reliable or always to be depended upon for separating the genera, the length of the malar space being variable in the same species, while the shape of the eyes merges gradually from a short oval to a long oval. I am, however, not yet prepared to reject the new genus *Loderus*, Konow, and give below the characters made use of by him for separating the two genera.

Table of Genera.

Three submarginal cells, the second long, receiving both recurrent nervures.

Eyes oval or rounded and strongly convex ; malar space as long or longer than the pedicel.....Dolerus, Jurine.

Eyes long-oval, slightly emarginate within ; malar space very short, linear, shorter than the pedicel.....Loderus, Konow.

Subfamily III.—Strongylogasterinæ.

This group or subfamily has been heretofore confused with the *Selandriides*, possibly on account of the similarity of neuration. To me, however, the genera here brought together under the above subfamily

name have very little real affinity with that family. On the contrary, taking into consideration their larval characteristics, their narrow elongate shape, and especially the shape of the head, I believe them to be genuine Tenthredinids, sufficiently differentiated from the original type to form a natural group by themselves, although not yet sufficiently divergent to be considered a distinct family. This group may be the phylum from whence originated the Selandriidæ.

The genera are very numerous, but may be recognized with the aid of the following table :

Table of Genera.

Lanceolate cell with a transverse or oblique nervure between the contraction and the apex.....3.

Lanceolate cell without such a cross-nervure, simply contracted but still open before the middle.

Hind wings with two discal cells ; front wings with four submarginal cells.

Third joint of antennæ usually longer than the fourth or of an equal length.....2.

Third joint of antennæ not longer than the fourth, usually a little shorter ; claws simple.

Anal cell in hind wings much shorter than the submedian ; sheaths usually triemarginate at apex...Thinax, Konow.

2. Head with the frontal area well defined, enclosing the front ocellus ; anal cell in hind wings a little shorter than the submedian, briefly petiolated ; antennæ slender, the first joint shorter than the second ; claws with a strong tooth at base..Stromboceras, Konow.

Head with the frontal area wanting or subobsolete ; anal cell in hind wings as long as the submedian.

Antennæ shorter, thicker, less distinctly pilose, the scape short, scarcely or rarely thicker than the pedicel ; third joint scarcely longer than the fourth ; claws bifid.....Strongylogaster, Dahlbom.

Antennæ long, pilose, tapering off toward tips, the scape large, much thicker than the pedicel ; third joint almost as long as joints 4–5 united.....Waldheimia, Brullé.

3. Front wings with three submarginal cells.....12.

Front wings with four submarginal cells.

Eyes not extending to base of mandibles, the malar space therefore distinct, as long or longer than the pedicel .....9.

Eyes extending to base of mandibles, or very nearly; lanceolate cell with an oblique cross-nervure, very rarely with a straight or perpendicular cross-nervure.

Hind wings with two discal cells.....7.

Hind wings with one discal cell.....6.

Hind wings without a discal cell.....4.

4. Hind wings normal, without a bordering nervure at apex.....5.
Hind wings with a bordering nervure at apex, although occasionally wanting between the radius and the cubitus.

Bordering nervure wanting at apical cell between the radius and cubitus; head and thorax coarsely cribrately punctate, opaque; antennæ rather short, stout, not tapering towards apex. ♂.....Pseudosiobla, Ashm., n. g.
(Type S. excavata, Nort.)

Bordering nervure entire; head and thorax smooth, shining, at the most sparsely punctate, except sometimes the head anteriorly; antennæ neither short nor stout, tapering toward tips, the third joint longer than the fourth; claws cleft.

Anal cell in hind wings as long as the submedian; flagellar joints cylindrical. ♂..Strongylogastroidea, Ashm., n. g.
(Type S. apicalis, Say.)

Anal cell in hind wings a little longer than the submedian; flagellar joints sub-compressed.
♂..... Dimorphopteryx, Ashm., n. g.
(Type S. pinguis, Say.)

5. Anal cell in hind wings as long as or longer than the submedian; clypeus deeply semicircularly emarginate; claws cleft.

Transverse median nervure uniting with the median vein at the middle of the first discoidal cell; third antennal joint not quite as long as joints 4–5 united; hind tarsi not longer than their tibiæ .....Parasiobla, Ashm., n. g.
(Type S. rufocinctus, Nort.)

Transverse median nervure uniting with the median vein much before the middle of the first discoidal cell; third antennal

joint longer than 4–5 united; hind tarsi much longer than their tibiæ.....Allomorpha, Cameron.*

Anal cell in hind wings shorter than the submedian, briefly petiolate; claws bifid.

Head and thorax coarsely cribrately punctate; third antennal joint as long as joints 4–5 united. ♀...Pseudosiobla, Ashm., n. g.

Head and thorax not cribrately punctate, shining; third antennal joint scarcely longer than the fourth.....Aomodyctium, Ashm., n. g.

6. Anal cell in hind wings not so long as the submedian, briefly petiolated, the second discoidal cell present; no closed submarginal cell.

Head and thorax coarsely cribrately punctate, opaque; antennæ rather short, stout, not tapering off at tips.

♀.....Pseudosiobla Ashm., n. g.
(Type S. excavata, Nort.)

Anal cell in hind wings a little longer than the submedian, a closed submarginal cell as well as the second discoidal cell present.

Head and thorax not cribrately punctate, shining; antennæ tapering toward tips, the third joint long but shorter than joints 4–5 united. ♀.....Parasiobla, Ashm., n. g.
(Type P. bicolor, Ashm.)

7. Anal cell in hind wings shorter than the submedian, briefly petiolated.....8.

Anal cell in hind wings as long or a little longer than the submedian cell.

Lanceolate cell with an oblique cross-nervure; claws cleft.

Clypeus large and deeply semicircularly emarginate.

Second joint of hind tarsi one-fourth the length of the basal joint; pedicel annular, wider than long.

♀.....Dimorphopteryx, Ashm., n. g.

Second joint of hind tarsi one-third the length of the basal joint; pedicel not annular, fully twice

*_Allomorpha_ may be wrongly placed in my table. Cameron says nothing about the venation of the hind wings. His description reads, "Alar neuration resembles _Strongylogaster_ (Cingulatus group)." Now, _S. cingulatus_ has two discal cells in the hind wings. Kirby, however, who, I believe, examined the type, says: "_Hind wings with one discal cell._" The artist, however, employed by Kirby has figured it on Plate X., No. 22, _without a cell in the hind wings!_ In my perplexity I have followed the artist, since I find his figures of sawflies known to me perfectly accurate.

as long as wide or still longer.
♀ .....Strongylogastroidea, Ashm., n. g.
(Type S. apicalis, Say.)
Clypeus truncate. ♂ .....Siobla, Cameron.
(Type S. mooreana, Cam.)

8. Claws bifid or cleft.
Clypeus small, truncate or at the most sub-emarginate anteriorly.
♀ .....Siobla, Cameron.
Claws simple or with a minute tooth at base; clypeus distinctly emarginate; head with the frontal area well developed, enclosing the front ocellus; third antennal joint longer than the fourth. ♀ .....Stromboceras, Konow.

9. Hind wings with two discal cells.....11.
Hind wings without a discal cell.....10.

10. Anal cell in hind wings shorter than the submedian, usually briefly petiolated.
Marginal cell in hind wings at apex subacute, *with* a short appendage, the recurrent nervure originating far before the transverse median nervure; claws cleft or with a long tooth at base.....Aphilodyctium, Ashm., n. g.
(Type S. rubripes.)
Marginal cell in hind wings at apex rounded, *without* an appendage, the recurrent nervure originating just before the transverse median nervure; claws with a triangular median or basal tooth.....Taxonus, Hartig.

11. Wings elongate, narrowed; hind tibiæ very long, nearly twice the length of their femora; anal cell in hind wings shorter than the submedian; claws bifid; clypeus triangularly emarginate anteriorly.....Rhoptroceros, Konow.
Wings normal; hind tibiæ not nearly twice as long as their femora; anal cell in hind wings fully as long as the submedian.
Transverse nervure in anal cell straight, perpendicular; claws with a median tooth; head coarsely punctate, opaque, without a frontal area; clypeus triangularly emarginate; third and fourth antennal joints equal..Polystichophagus, Ashm., n. g.
(Type S. filicis, Klug.)
Transverse nervure in anal cell oblique; claws cleft or simple.
Clypeus semicircularly emarginated; frontal area poorly

defined; third antennal joint longer than the fourth; claws cleft.....Hypotaxonus, Ashm., n. g.
(Type T. pallipes, Say.)

Clypeus truncate anteriorly or at most sub-emarginated; frontal area distinct, enclosing the front ocellus; third antennal joint not longer than the fourth; claws simple.....Hemitaxonus, Ashm., n. g.
(Type T. dubitatus, Nort.)

12. Hind wings without a discal cell.....14.
Hind wings with one discal cell.....13.
Hind wings with two discal cells; anal cell in hind wings a little shorter than the submedian, briefly petiolated..Heptamelus, Haliday.
(=Cænoneura, Thoms.)

13. Anal cell in hind wings a little shorter than the submedian, briefly petiolated; claws cleft or bifid.
Abdomen depressed, ovate; first submarginal cell much longer than the second; antennæ long, the flagellum sub-compressed.....Harpiphorus, Hartig.
Abdomen more or less compressed, strongly constricted beyond the base; first submarginal cell not or scarcely longer than the second; antennæ short, slender, thickened beyond the middle.....Emphytoides, Konow.

14. Anal cell in hind wings shorter than the median; clypeus anteriorly sub-emarginated; claws with a small tooth at base. Emphytus, Klug.

Subfamily IV.—Tenthredininæ.

This subfamily is probably the most extensive one in the family, there being several hundred species already described, the majority of which are found in the Palearctic and Neotropical regions. The subfamily is easily recognized by the lanceolate cell in the front wings, which is either contracted before the middle and *closed*, or divided into two parts by a straight or an oblique nervure.

Two of the described genera, viz., *Parabia*, Somenow, and *Cocosyndia*, Kirby (=Pampholyx, Freymuth), I have been unable to place in my tables, not being able to obtain specimens, nor to consult the descriptions.

Pampholyx, Freymuth, was changed to *Cocosyndia* by Kirby on account of the former name being preoccupied; but he gives no description of it, merely stating that it is the only wingless sawfly known. I have

been unable to obtain a copy of the work, in which it was described, in any of the libraries of Washington and Philadelphia.

The numerous genera belonging to the group may be tabulated as follows :

Table of Genera.

Lanceolate cell with an oblique or straight cross-nervure usually situated a little before the middle.....5.

Lanceolate cell contracted and closed a little before the middle.

Hind wings without a discal cell.....4.

Hind wings with one discal cell.....3.

Hind wings with two discal cells.

Malar space wanting or scarcely apparent, the hind coxæ much elongated.....2.

Malar space distinct, the hind coxæ normal.

Contraction of lanceolate cell very short.

Anal cell in hind wings as long as the submedian.

Marginal cell normal. ♀. ...Perineura, Hartig. (=*Synairema*, Hartig.)

Marginal cell with two transverse radial nervures. ♀. (An anomalous form of *Perineura*, named *Bivena*, MacGillivray.*)

Anal cell in hind wings shorter than the submedian.

Head and thorax opaque, cribrately punctate; antennæ short.....Sciopteryx, Stephens. (?=Zermakia, Jakow.)

Head and thorax smooth, shining, at the most sparsely punctate; antennæ not short.....Rhogogastera, Konow.

Contraction of lanceolate cell long; anal cell shorter than the submedian; clypeus semicircularly emarginated; claws cleft.....Pachyprotasis, Hartig.

2. Anal cell in hind wings shorter than the submedian.....Macrophya, Dahlbom.

3. Hind wings with a surrounding nervure at apex, the anal cell a little shorter than the submedian. ♂.....Tenthredopsis, Costa.

*Mr. MacGillivray has kindly sent me the type of *Bivena* for study, and I find it to be an anomalous form of *Perineura americana*, Provancher. It also bears a superficial resemblance to *P. delta*, Prov., but the anal cell in the latter is not contracted, but has a *cross-nervure*.

4. Hind wings with a surrounding nervure at apex. ♂ ..Perineura, Hartig.

5. Malar space wanting or very narrow, linear, always shorter than the pedicel.....6.
Malar space distinct, as long or longer than the pedicel or second joint of antennæ.....10.

6. Lanceolate cell with an oblique cross-nervure.....9.
Lanceolate cell with a short, straight or perpendicular cross-nervure.
Hind wings without a discal cell.....8.
Hind wings with one discal cell.....7.
Hind wings with two discal cells.
Anal cell in hind wings as long as the submedian.
♀.....Tenthredopsis, Costa.
Anal cell in hind wings a little shorter than the submedian.
Head and thorax cribrately punctate; antennæ short, not tapering at tips. ♀.....Sciopteryx, Stephens.
Head and thorax smooth, shining, at the most sparsely punctate; antennæ not short, tapering toward tips. ♂.....Rhogogastera, Konow.

7. Hind wings with a surrounding nervure at apex, the anal cell a little shorter than the submedian. ♂.....Tenthredopsis, Costa.
Hind wings without a surrounding cell at apex, the anal cell a little shorter than the submedian. ♂.....Amestasteiga, Costa.

8. Hind wings with a surrounding nervure at apex, the anal cell as long as the submedian. ♂.
Hind wings without a surrounding nervure at apex.
Anal cell as long as the submedian. ♂...Homœoneura, Ashm., n.g. (Type P. delta, Prov.)
Anal cell shorter than the submedian. ♀..Rhogogastera, Konow.

9. Hind wings with two discal cells, the anal cell shorter than the submedian.....Pachyprotasis, Hartig.
Hind wings with one discal cell, the anal cell as long as the submedian.....Beleses, Cameron.

10. Hind wings with two discal cells.....11.
Hind wings with one discal cell.....14.
Hind wings without a discal cell.....15.

11. Wings not narrowed, the transverse radius not or rarely strongly curved.....12.

Wings narrowed, the transverse radius strongly curved; lanceolate cell long and narrow, with a short cross-nervure; anal cell in hind wings as long as the submedian; head quadrate; antennæ long and slender, the third joint a little shorter than the fourth, the following gradually shortening, the second with a small tooth within at apex.....Dipteromorpha, Kirby.

12. Hind coxæ normal, the femora not or rarely extending to the tip of the abdomen.....13.

Hind coxæ much lengthened, so that the femora extend to or beyond the tip of the abdomen; lanceolate cell with a short straight nervure (or shortly contracted); anal cell in hind wings shorter than the submedian.....Macrophya, Dahlb.
(= Emilia, Costa.)

13. Frons on each side above the antennæ elevated into more or less distinct ridges and with deep furrows on either side; antennæ 9-jointed, filiform, slender toward tips, the third joint never longer than joints 4–5 united; anal cell as long as the submedian.....Tenthredo, Linné.

Frons on each side above the antennæ truncate, or feebly emarginate and without or with only a feeble furrow between the antennæ; antennæ usually more or less thickened before apex.

Antennæ 8-jointed.....Labidia, Prov.

Antennæ 9-jointed.

Anal cell in hind wings shorter than the submedian.

Clypeus subemarginate; antennæ long, slender, tapering off at tips, the third joint much longer than fourth, but shorter than 4–5 united.
♀.....Tenthredopsis, Costa.
(? = Parastatus, Kirby.)

Clypeus deeply semicircularly emarginate; antennæ not long, subclavate, or somewhat thickened towards apex, the third joint long, longer than 4–5 united.....Allanthus, Jurine.

Clypeus truncate; antennæ not long.
♀.....Laurentia, Costa.

Anal cell in hind wings as long or a little longer than the submedian; claws cleft.

Scutellum normal or only slightly elevated; transverse median nervure straight perpendicular and placed before the middle of the anal cell.

Head small, much narrower than the thorax; clypeus at apex truncate or rounded; antennæ much shorter than the abdomen, incrassated towards apex.....Colochelyna, Konow.

Scutellum conically elevated; transverse median nervure oblique and placed beyond the middle of the anal cell; clypeus deeply emarginated.....Conaspidia, Konow.

14. Hind wings without a surrounding nervure at apex.

Lanceolate cell with an oblique cross-nervure; third joint of antennæ longer than joints 4–5 united..Aglaostigma, Kirby.

Lanceolate cell with a straight cross-nervure; anal cell in hind wings fully as long or a little longer than the submedian; clypeus truncate. ♀.....Homœoneura, Ashm. (Type P. delta, Prov.)

Hind wings with a surrounding nervure at apex; lanceolate cell with a straight cross-nervure; anal cell in hind wings a little shorter than the submedian. ♂.....Tenthredopsis, Costa.

15. Hind tarsi not longer than their tibiæ; hind wings with a surrounding nervure at apex; anal cell as long as the submedian; clypeus truncate. ♂.....Homœoneura, Ashm.

Family XV.—Cimbicidæ.

The 5- to 8-jointed, clavate antennæ, in both sexes, and the acutely margined abdomen readily distinguish this family from all the other families of sawflies. It may be separated into two subfamilies as follows:

Table of Subfamilies.

Lanceolate cell with a transverse nervure.....Subfamily I., Cimbicinæ.
Lanceolate cell contracted at the middle.....Subfamily II., Abiinæ.

Subfamily I.—Cimbicidæ.

This subfamily contains rather large, robust sawflies, with rather stout or more or less swollen hind femora, which are often toothed beneath, and always have the lanceolate cell in the front wings divided into two parts by a transverse nervure. Their larvæ are external feeders and are scarcely distinguishable from the *Tenthredinidæ*.

Table of Genera.

First dorsal abdominal segment posteriorly deeply emarginate, and filled with a chitinous membrane; hind femora not toothed..Cimbex, Oliver.
First dorsal abdominal segment posteriorly not or scarcely emarginate and without a membrane; hind femora more or less distinctly toothed.
Antennæ 8-jointed, with five joints before the indistinctly jointed club.....Trichiosoma, Leach.
Antennæ 7-jointed, with four joints before the indistinctly jointed club.....Clavellaria, Leach.

Subfamily II.—Abiinæ.

The species included in this subfamily resemble those of the former in shape and general appearance, but as a rule are much smaller, more or less metallic, and may be easily separated from them by the difference in the lanceolate cell, which is always longly contracted at or a little before the middle. Five genera have been recognized, separated as follows:

Table of Genera.

First submarginal cell not receiving both recurrent nervures.....2.
First submarginal cell receiving both recurrent nervures; antennæ 7-jointed (the seventh joint sometimes showing an indistinct suture), the third joint long, bent, club 3-jointed.....Abia, Leach.
2. First and second submarginal cells each receiving a recurrent nervure.....3.
First submarginal cell receiving only one recurrent nervure, the second recurrent interstitial with the second transverse cubitus.
Antennæ 7-jointed, the club 2-jointed.....Praia, André.
Antennæ 6-jointed, the club unjointed.....Plagiocera, Klug.
3. Stigma normal; fourth joint of antennæ about half the length of the third.....Amasis, Leach.
Stigma abnormally large, and produced outwardly beyond the costal margin; fourth joint of antennæ two-thirds the length of the third.....Pachylosticta, Klug.

PERSONAL.

We wish to offer our very hearty congratulations to the Rev. T. W. Fyles on his receiving the degree of D. C. L. *honoris causa* from the University of Bishops' College, Lennoxville, P. Q., at a recent convocation. The ability and scientific work of the reverend Doctor well entitle him to this distinction.

Carl F. Baker has left Auburn, Ala., on a two years' leave of absence. He goes as Field Botanist to the Herbert H. Smith Exploring Expedition, which will be engaged in biological work in North-western South America. All letters, etc., for him should be addressed to St. Croix Falls, Polk Co., Wisconsin.

NOTES ON COCCIDÆ, WITH DESCRIPTIONS OF NEW SPECIES.

BY J. D. TINSLEY, NEW MEXICO EXPERIMENT STATION, MESILLA PARK, N. M.

ERIOCOCCUS TINSLEYI, Ckll.

Adult ♂. Length, 1.3 mm.; expanse of wings, 2.5 mm.; colour, head and abdomen purplish-gray; mesothorax light ochreous, some specimens show a white longitudinal streak on the abdomen. Legs and antennæ concolorous with body. Antennæ 10-jointed. Joint 2 is bottle shaped, proximal end smallest, 70 μ long, practically identical with second joint of *Phenacoccus solenopsis*, Tins., except that *E. Tinsleyi* has a number of stout blunt spines interspersed with the bristles; joint 3 cylindrical, considerably longer than any of the others (130 μ long), only differing from *P. solenopsis* in having the stout blunt spines; joint 4 often shorter than 5, but sometimes longer, 76–85 μ; joint 5, 81–87 μ long; joint 6 usually next, longer than 2, 68–78 μ long; joint 7 shorter than 2, 68 μ long; joint 10 usually next, 65 μ; next 8, 56 μ; shortest 9, 50 μ. Joint 10 is flask shaped, tapering distally. All the segments bear the stout blunt spines, interspersed with rather stout bristles. Formula 3, 5, 4, 6, 2, 7, 10, 8, 9.

Legs rather slender; femur tapering proximally, 180 μ long, with some medium sized bristles; tibia quite slender, tapering very slightly proximally, 250 μ long, quite bristly, with the stout blunt spines interspersed; tarsus bristly and with the stout blunt spines, 90 μ long, bearing a pair of short stout digitules which are very slightly dilated at the end; claw rather slender, 20 μ long.

The usual pair of long slender white caudal filaments. Male sac creamy white, about 2 mm. long and .75 mm. wide, elliptical, inclining to cylindrical.

Hab.—On roots and portions of stems lying on the ground, of Atriplex canescens. A. and M. College campus, Mesilla Park, N. M.; Aug. 4, 1898; coll. J. D. Tinsley.

ERIOCOCCUS TINSLEYI, Ckll.

♀. Having recently studied this species somewhat in detail, I wish to add the following facts to Prof. Cockerell's description in CANADIAN ENTOMOLOGIST., Vol. XXX., No. 9, p. 247. The antennæ

(Fig. 20) in this species are quite variable both in regard to the relative length and actual size of the segments. I have observed the following formulæ: $\begin{matrix} 4\ 3\ 7\ 2\ 5\ 6 \\ 3\ 4\ 2\ 7\ 6\ 5 \\ 4\ 3\ 2\ 7\ 6\ 5 \end{matrix}$. While in many cases the tarsus is longer than the tibia (Ckll., *loc. cit.*), yet they are often subequal. The full-grown young females appear much more spiny than the old females.

Some time since I received specimens on *Malvastrum coccineum*, collected by Mr. E. Bethel, at Denver, Colo., which I at the time thought to be a distinct species, and from those specimens prepared the accompanying figure. I now consider them to be this species.

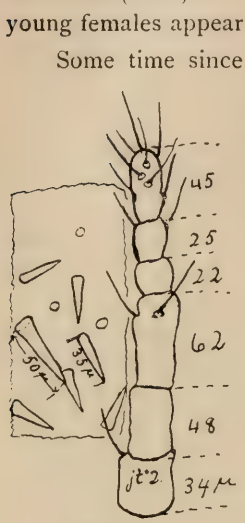

FIG. 20.

Prof. Cockerell has, in Aug., 1898, collected specimens on the leaves of *Atriplex canescens*, growing on the campus of the A. and M. College of N. M., which I also refer to this species.

The Colorado specimens are fairly constant in their antennal formulæ of 4 3 2 7 5 6.

The specimens on the leaves of Atriplex are quite variable in their formulæ; *e.g.*: $\begin{matrix} 3\ 4\ 7\ 2\ 5\ 6 \\ (3\ 4)\ 7\ 2\ 5\ 6 \\ 3\ (4\ 7)\ 2\ 5\ 6 \\ 3\ 4\ (7\ 2)\ 5\ 6 \end{matrix}$ Their legs and antennæ are stouter than in the type form, and they have more hairs between the bases of the antennæ and legs.

DACTYLOPIUS KINGII, Ckll., var. *Neo-Mexicana*, n. var.

During the past summer I collected this insect on the roots of *Gutierrezia sarothræ* in the Organ Mts., N. M., at an altitude of about 5,000 feet. They were, in all cases, attended by ants.

Adult ♀. Length, 2 mm.; width about 1 mm. Shape, ellipsoidal, rather plump. Colour yellowish. Nearly naked; no lateral or caudal filaments; dorsum sparsely mealy. The antennæ are 8-jointed, and with the formula of *Kingii*, 81235764, the fourth joint, while shortest, is relatively longer than it usually is in *Kingii*. Hairs on the segments about the same as in *Kingii*, perhaps a little smaller. The whole antenna is a little smaller than is usual in *Kingii*. Legs are rather smaller than in *Kingii*; femur 130 μ long; tibia, 140 μ long; tarsus, 75 μ long;

claw, 25 μ long. Hairs and digitules nearly as in *Kingii*. The most marked difference is in the ovisac. *Kingii* secretes a loose, fluffy, shapeless ovisac, while this var. secretes a compact, elliptical ovisac, very little larger than the female, in which the female lies partially embedded. The ovisac resembles that of an *eriococcus* very much.

PHENACOCCUS SOLENOPSIS, Tinsley.

Adult ♂. Length, 1 mm.

Colour white, head tinged with gray, eyes red, mesothorax yellowish, legs light yellowish brown. Antennæ 10-jointed; joint 1 short and stout, 35 μ; joint 2 bottle shaped, proximal end smallest, 70 μ long; joint 3 is considerably longer than any of the others, being 120 μ long; joint 5 next, being 90 μ; 6 next, 85 μ; the remaining joints are variable in relative length. Formulæ of the antennæ of one individual: 3 4 5 (6 9) 10 7 2 8 1
3 4 5 (6 8) (7 9) 10 2 1

All the segments are quite bristly. Legs rather slender. Femur 250 μ long, bearing a few bristles; tibia 265 μ long, bearing numerous stout bristles; tarsus 95 μ long, bearing numerous stout bristles; claw 31 μ long, rather slender. Tarsal digitules long and slender; claw without digitules. The usual caudal filaments.

Hab.—On roots of *Atriplex canescens*; Aug. 4, 1898; coll. J. D. Tinsley.

DACTYLOPIUS AZALEÆ, n. sp.

Adult ♀. About 3 mm. long, about 2 mm. wide.

Flattened ellipsoidal, rather pointed at the ends. Colour of dried specimen, purplish-gray secretion, white, granular, practically hiding the true colour of the body. Lateral filaments very short on the thorax, increasing in length toward the anal extremity. Caudal filaments not conspicuously longer than those of posterior segments of the abdomen. The lateral and caudal filaments are just easily seen with the naked eye. Epidermis with numerous spinnerets. Dorsum with scattered, rather large, hairs. Ventrally the hairs are quite large and rather numerous, especially on the posterior segments. Largest hairs on posterior segments are 60 μ long. Sides with rows of spinneret spine areas.

Antennæ colour reddish, 8-jointed; medium size, all the joints have quite long hairs. The joints are rather variable in their relative lengths;

1 and 2 are often subequal, although in many cases 2 is appreciably longer, and 3 may be longer than 1 ; 5 is most usually longer than 7 ; 4 and 6 are shortest, sometimes one and sometimes the other. Two of the most common formulæ are 8(12)35746 and 82315764. (See figure 21.) Legs reddish, medium size. Femur, 215 μ long, 85 μ wide, with long, rather slender hairs.

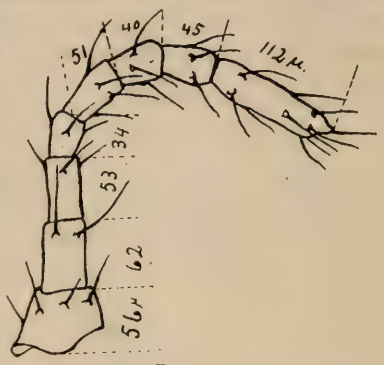

FIG. 21.

Tibia 215 μ long, with long, rather slender hairs; tarsus 112 μ long ; claw 33 μ long ; digitules of tarsus 40 μ long, knobbed ; digitules of claw long, slender, knobbed.

Anal lobes bearing one large long hair (250 μ long), and one smaller hair. The usual group of spinnerets and spines. The spines quite stout.

Anal ring with the usual 6 hairs, which are quite large (140 μ long).

Boiled in potash the insects turn a very dark bluish green, almost black ; if they are now treated with acid they turn red. The colouring matter contained in this insect has been found in but few other Coccids ; most Coccids turning a red, of some shade, when treated with potash.

Ovisac loose and fluffy, white, not covering the female, but containing the eggs, which are purplish.

Hab.—On Azalea in Japanese nursery, San José, Cal. Collected by Mr. Edward M. Ehrhorn ; Sept., 1898.

Remarks.—This species is very closely allied to D. pandani, Ckll., especially in the characters of the antennæ, anal lobes and ring, and the hairs on the epidermis. It differs, however, in colour, secretion on margin, and colour in potash. Being found in a Japanese nursery, it is almost impossible to say from whence it came, but it may possibly be Japanese.

DESCRIPTIONS OF NEW NOCTUIDS.

BY JOHN B. SMITH, RUTGERS COLLEGE, N. J.

Eutolype grandis, n. sp.

Ground colour an even, smooth, bluish-gray, washed with smoky brown. Head with a little admixture of brownish in front. Collar with a small central brown spot. Patagiæ margined with brown. Basal tuft of thorax with an admixture of black scales. Primaries with all the ordinary markings obscured, the most evident feature being a broad light gray band at inner third, outwardly margined by a brownish shade, which is the darkest part of the wing. The basal space is uniformly smoky gray to the t. a. line, which is narrow, geminate, even, a little incurved between the subcostal and submedian veins. The included space is light gray, and the light gray shade extends to the rigid median shade, including the orbicular. T. p. line narrow, geminate, denticulate, widely bent over the cell, then with a deep incurve beneath, narrowing the median shade at the inner margin. The entire median space beyond the gray band has a warm brown tint in which the large reniform is obscurely visible as a dull, lead-coloured blotch, outlined by paler gray scales. Beyond the t. p. line the wing is of the same dull gray as at base, interrupted by the diffuse, somewhat irregular s. t. line. There is a dusky line at the base of the fringes, which are alternately black and white marked at their tips. Secondaries smoky brown, much paler at base, and with a darker line at the base of the fringes. Beneath, primaries smoky blackish, powdered with bluish-gray scales in the terminal space. Secondaries grayish-white, powdery, with a blackish outer line and discal spot.

Expanse 1.70 inches = 42 mm.

Habitat.—Kansas City, Mo., March 28; F. J. Hall. Massachusetts.

The type is a fine male received from Mr. Hall, who has others, I believe. The antennæ are yellow and lengthily pectinated. This is the largest species thus far known of the genus, and recognizable also by the peculiar banding of the fore wing, which is unique thus far. The Massachusetts specimen is in the Strecker collection, and has been in his hands for several years.

Hadenella lævigata, n. sp.

Ground colour brown with a reddish tinge, the pale shades gray. Head dark, without special markings, except that there may be a paler line between the antennæ. Collar with a darker, sometimes black, line above the middle. The base and tip with gray scales. Thorax without

distinct maculation. Primaries with all the markings fairly evident. As a whole, the wing is darker from the base to a little beyond the middle; then a variably distinct pale gray or even whitish shading extends to the s. t. line, the terminal spaces being again dark. There is a variable amount of red in the dark colouring of the wing, and sometimes the median space is quite distinctly reddish. Basal line geminate, black, not very well defined. T. a. line geminate, black, the included space marked by white scales, as a whole forming a rather even outcurve and only a little irregular between the veins. The extreme base may be a little lighter than the rest of the basal space. T. p. line geminate, brown, usually not very distinct for the upper portion of its course, because it passes through the pale space already described. It makes a wide outcurve over the reniform and a correspondingly deep incurve under the cell. The s. t. line is distinct, emphasized by the difference in shade between the dark terminal and the paler preceding space; and it is also emphasized by a dusky shading which precedes it, and thus shows that it has three rather even and equal outcurves. There is a black terminal line, followed by a yellowish line at the base of the dull brown fringes; the outer margin just a little irregular. There is a trace of a median shade on the costa extending between the ordinary spots to the median vein; but not traceable below that point. The claviform is moderate in size, extends half way across the median space, is outlined by black scales, filled with the ground colour of the wing and followed by a reddish blotch. Orbicular moderate in size, a little oblique, outlined by black scales and hardly paler than the rest of the wing. Reniform large, broad, hardly kidney-shaped, and yet less indented inwardly than at the outer side; usually of the palest colour of the wing. The veins through the pale part of the wing are usually marked by blackish scales. Secondaries an even smoky gray; fringes a little paler and with a yellowish line at the base. Beneath, powdery gray; the secondaries with a more or less obvious discal dot and powdery outer line. In some specimens the primaries also show a trace of this line, and in others neither of the wings have any markings whatever.

Expanse 1 to 1.12 inches = 25 to 28 mm.

Habitat.—Glenwood Springs, Colorado, in August; Dr. Barnes. Garfield County, Colorado; Mr. Bruce.

I have eight specimens under examination and have seen others, most of them females. The latter are as a whole larger, the markings

more sharply defined, with more contrast and more red. The males are much less contrasting, but otherwise do not differ preceptibly. No two specimens are quite alike ; but in a general way we have a reddish shade through the middle of the wings, a pale gray shade to the s. t. line, and the s. t. line itself is rather well marked by the three subequal outcurves. The species reminds one of *Bryophila ;* but the vestiture is rougher, and there is a series of small dorsal tufts on the abdomen.

Hadenella subjuncta, n. sp.

Ground colour ashen gray, varying in colour and in depth ; sometimes with a very strong admixture of brown or reddish. Head usually darker, in pale specimens sometimes with a dark band below the antennæ. Collar with a blackish line in the middle. Primaries with all the markings traceable in most of the specimens ; in some very dark forms considerably obscured. Basal line geminate, black, usually marked on the costa only. The basal space is usually powdered or light in colour superiorly, while along the inner margin there is a blackish or black shade below the submedian vein. T. a. line geminate, black, with a rather even outcurve. The included space paler, sometimes marked with white scales. The t. p. line geminate, blackish in some cases, brown in others ; the included space usually white, strongly bent over the reniform and deeply incurved below. The s. t. space is usually paler, more or less white powdered to the whitish s. t. line. This has two large and one smaller outcurve, and is defined by the dark ordinary space and a dusky preceding shade. The veins are marked with blackish through the paler portion of the wing. There is a series of black terminal lunules, beyond which there is a pale line at the base of the fringes ; the latter are rather pale, but cut with smoky opposite the interspaces. A median shade is marked on the costa and extends beyond the reniform, where it becomes lost in some specimens ; but in others reappers close to the t. p. line in the inferior portion of the wing. There is a dusky blotch which cuts the s. t. line in the submedian interspace. The claviform is moderate in size, of the ground colour, extends less than half way across the median space, but is continued by a black streak or bar to the t. p. line. Above this black bar there is a reddish shade, which varies as the examples are dark or light in colour. The orbicular is oval, oblique, somewhat irregular, usually paler than its setting. The reniform is kidney-shaped, of good size, a little oblique, usually white marked ; but variable, according to the ground colour of the wing. Secondaries dull, smoky

fuscous ; fringes with a pale line at the base. Beneath, gray powdered. Secondaries usually with a darker discal spot. None of the examples that I have seen had any maculation on the primaries.

Expanse .80 to 1 inch = 20 to 25 mm.

Habitat.—Glenwood Springs, Colo., Aug. ; Dr. Barnes. Garfield County, Colo., 6,000 feet ; Bruce. Calgary, Canada, July 9th, 16th, 19th and 27th ; Mr. Dod.

Thirteen specimens are under examination and others are in collections. This is an ally of *lævigata*, with the same type of maculation ; but considerably smaller in size. It is as variable in colour as the other species ; but in this case the females are the darker and smaller as a whole, while the males are brighter and have the contrast much better marked. In all the specimens the black line connecting the ordinary median lines is well marked. In all specimens the dorsal tuftings, particularly in the male, are obvious.

Lathosea ursina, n. sp.

Ground colour a very pale whitish-gray, the maculation black or smoky brown. Head and thorax without markings ; the vestiture very long, hairy, loose, and a little mixed with brown and gray, so as to give a somewhat powdery appearance. The sides of the palpi are blackish. Primaries with all the transverse markings obliterated. The most obvious ornamentation is a series of black dashes in the interspaces beginning between veins one and two and extending to just below the apex ; in all five of these blotches arranged in an oblique series. A brown shade extends through the cell and the median vein is bordered on both sides with blackish. A black basal dash extends a short distance through the submedian interspace, and another black dash marks the internal angle. Vein one is also usually black marked. A brownish shading occupies most of the centre of the wing, leaving the costal and terminal spaces a little paler, though the white powdering sometimes extends also along the internal margin. The ordinary spots are vague, pale, without defining lines : the orbicular transversely oval ; the reniform an indefinite small lunule. The veins are more or less powdered with black. Secondaries smoky gray, with a more or less well-defined discal lunule, which is rather a reflection of what is found on the under side. Beneath whitish, powdered with gray, the veins darker marked. The secondaries with a fairly well defined discal lunule in most specimens.

Expanse 1.40 to 1.60 inches = 35 to 40 mm.

Habitat.--Glenwood Springs, Colo., March 27th to April 13th; Dr. Barnes. Garfield County, Colo., 6,000 feet; Mr. Bruce.

Twelve specimens are under examination, only one of which is a female. Judging from this single example, there is no difference between the sexes, except possibly in size, because the female is next to the smallest specimen in the series; but this may be an accidental occurrence. As compared with *pullata* this is a smaller species, not nearly so dark, and distinct by the oblique series of black marks in the interspaces.

Pleroma bonuscula, n. sp.

Ground colour a very dark, powdery blue-gray. Head without perceptible markings; the antennæ whitish anteriorly. Collar with the basal half whitish-gray, relieving a narrow black transverse line. The disc and patagiæ have no special markings. The primaries are as a whole a little paler in the costal region. The transverse maculation is much obscured and hardly traceable, except on the costa. T. a. line single, blackish, preceded by white scales. It is oblique to the median vein, then forms an incurve, with another tooth on the submedian vein, which meets the t. p. line at the same point. The t. p. line is geminate, blackish, the included space marked with whitish scales. It is very slender, and as a whole very evenly oblique inwardly, reaching the inner margin at the same point with the t. a. line. There is a traceable median shade which parallels the t. p. line just within its course. S. t. line whitish, broken, consisting rather of a series of spots which do not extend quite to the apex, preceded by blackish spots and shades and sending in opposite the anal angle a white tooth which extends to the t. p. line. The terminal space is dusky. The ordinary spots are very feebly marked: the orbicular not traceable in the specimens before me; the reniform an irregular, small, upright mark. Secondaries smoky brown, without obvious markings, except a vague discal lunule. Beneath pale brown, powdery. Secondaries with a distinct discal spot, and primaries with an indication of such a spot, which may become better marked in some cases than in the examples before me.

Expanse 1.20 inches = 30 mm.

Habitat.—Glenwood Springs, Colo., in March; Dr. Barnes.

Three male specimens are under examination and they agree closely; none of them are quite perfect, and were taken at the electric lights. As compared with *obliquata* this is a smaller species and much more obscure in general appearance. The type of marking is the same; but in the

new species the s. t. line is a much more distinctive feature, particularly in the tooth which it sends to the t. p. line in the submedian interspace.

There is another undescribed species from California belonging to this genus; but the material is at present insufficient to enable me to characterize it properly. I call attention to this fact at present because the female type of *obliquata* is from California and is not the same species as the male examples which I marked type from Colorado. In other words, what I considered at the time that I described *obliquata* to be sexual differences are really specific. I have since seen male examples from California that agree with my female type, but have no male myself to authorize a description.

THE COCCID GENUS SPHÆROCOCCUS IN MASSACHUSETTS.

BY T. D. A. COCKERELL AND GEO. B. KING.

Sphærococcus sylvestris, n. sp.

Much like an *Eriococcus* in shape, 2½ millim. long, 1½ wide, dark dirty brown, with a little white cottony down at its anal end, and on the mid-dorsal line a distinct longitudinal nearly white band. (King.)

♀.—Boiled and mounted in balsam, broad oval, 2 millim. long, transparent, without legs. Antennæ pale brownish, thick, subconical but very blunt at end, about 100 μ long, five-segmented; of the segments, 3 is longest, and about as broad as long; 5 next longest, slightly longer than broad; the others more than twice as broad as long, very short, 4 the shortest; 5 with a few bristles at tip. Mouth-parts yellowish-brown, very large and well-developed, about 200 μ wide. Anal ring hairless; caudal tubercles quite absent, their place represented by a few hairs. A few circular dermal glands in the caudal region. Two large stout spines, and a few small ones, on each side of the body. Spiracles as usual in the genus. (Ckll., from King's Mount.)

Hab.—Methuen, Mass., June 15, 1898, on white oak. (King.)

This is a most interesting discovery in every way, no *Sphærococcus* being hitherto reported from America. Whether the present insect is strictly congeneric with Maskell's type of *Sphærococcus* from Australia, must remain uncertain until the newly-hatched larva is found; but there is nothing in the adult ♀ on which to make a generic separation. At all events, our insect is surely congeneric with *Sphærococcus parvus*, Maskell, found on cherry, and possibly on oak, in Japan.

S. sylvestris will be readily known from *parvus* by its better developed antennæ.

CORRECTIONS.

The Rev. Dr. Fyles writes that the title of his paper on page 294 (November, 1898), "Tæniocampa alia, Gn., at Quebec," is incorrect, and should read, "*Tæniocampa subterminata*, Smith, at Quebec."

Prof. A. R. Grote, Hildesheim, Germany, writes: "On page 257, I find my name *Melanomma auricinctaria* changed to *M. auricinctarium*. I protest against this alteration in my original spelling. In all cases the gender implied originally by the author should be conformed to subsequently..... If I conceive of *Melanomma auricinctaria* as a golden-ringed, black-eyed woman, there is none competent to contradict me and insist that I should conceive of it as a golden-ringed, black-eyed stone!" "I refer to Bull. U. S. Geol. Survey, Vol. IV., 674, 1878, for my opinion as to the position of *auricinctaria*. I have not since examined the insect, which, I agree with Dr. Dyar, is not a Geometrid. It may be a pyralidiform Noctuid, allied to *Boletobia fuliginaria*, which I only know from figures.

"I also wish to correct the corrupt spelling of two species of *Plusia*, which has been lately used. It is *Plusia æreoides*, not *æroides;* also, it is *P. pasiphæia*, not *pasiphæa*."

ACKNOWLEDGMENT.

Sir,—I desire on behalf of the Entomological Society of Ontario, to acknowledge the receipt of three species of Noctuides, new to the Society's collection, from Mr. C. E. Grant, of Orillia, Ont.:

Rhynchagrotis gilvipennis, Grote.

Carneades pleuritica, Grote.

Mamestra vicina, Grote.

Also, a pair of fine, fresh *Euprepia Caja*, Linn., and three *Catocala Antinympha*, Hub., which, he said, came last season in profusion to a light in his window.

Also, bred specimens of the following species of *Hydræcia*, from Mr. H. Bird, Rye, N. Y.: A pair each of *H. purpurifascia*, G. and R.; *H. rutila*, Guen.; *H. nitela*, var. *nebris*, Guen.; and a single specimen of *H. necopina*, Grote.

The delightful fresh bloom upon these specimens, in contrast to those that are taken by capture, is quite surprising, and has to be seen to be fully realized.

J. Alston Moffat, Curator.

BOOK NOTICE.

HANDBOOK OF INSECTS INJURIOUS TO ORCHARD AND BUSH FRUIT.—By Eleanor A. Ormerod. Simpkin, Marshall & Co.: London, Sept., 1898. 8vo., 286 pp.

The excellent work which has been done for economic entomology by Miss Ormerod, particularly in England, but also in many other parts of the world, is well known to everyone. Her valuable annual reports are eagerly looked for every year by all interested in the practical application of the study of insects for the prevention of their injuries to crops. We have just received from this talented authoress another evidence of her unselfish labours for the good of her countrymen. The above named volume is in reality a compendium of the original observations made during the last twenty-one years by Miss Ormerod and her correspondents, together with the latest results and the most approved remedies for the various pests of large and small fruits.

As in all former publications bearing Miss Ormerod's name, the arrangement of the subjects for convenience of reference, the presswork and the general get-up of the volume bear the stamp of a most careful and tasteful master hand. The different fruit crops treated of are: Apple, cherry, currant, gooseberry, medlar, nut, pear, plum, quince, raspberry, and strawberry. At the end is a list of the fruit crops infested by insects, with the names of the insect infestations; the subjects are arranged alphabetically; and after the name of each tree or crop mentioned in the work the names of each of the infestations to which it is liable in England are classified under subordinate headings as Bark, Blossoms, Fruit, Leaves, Shoots, Wood, according to the nature of the attack. The insects are given with their scientific and popular names, and so far as possible are arranged together as to kinds, as Aphides, Beetles, Moths, etc., with the number of the page of the detailed observation in the volume. In four instances where the pests are causes of much mischief to several kinds of crops, the infestation appears under its own name. These exceptions are: Earwig, Red Spider, Root-knot Eelworm, and Wasps.

Particular mention must be made of the excellence of the illustrations, which seem to be perfect types of what such illustrations should be in works on insects for the use of practical fruit-growers.

J. FLETCHER.

Mailed December 13th, 1898.

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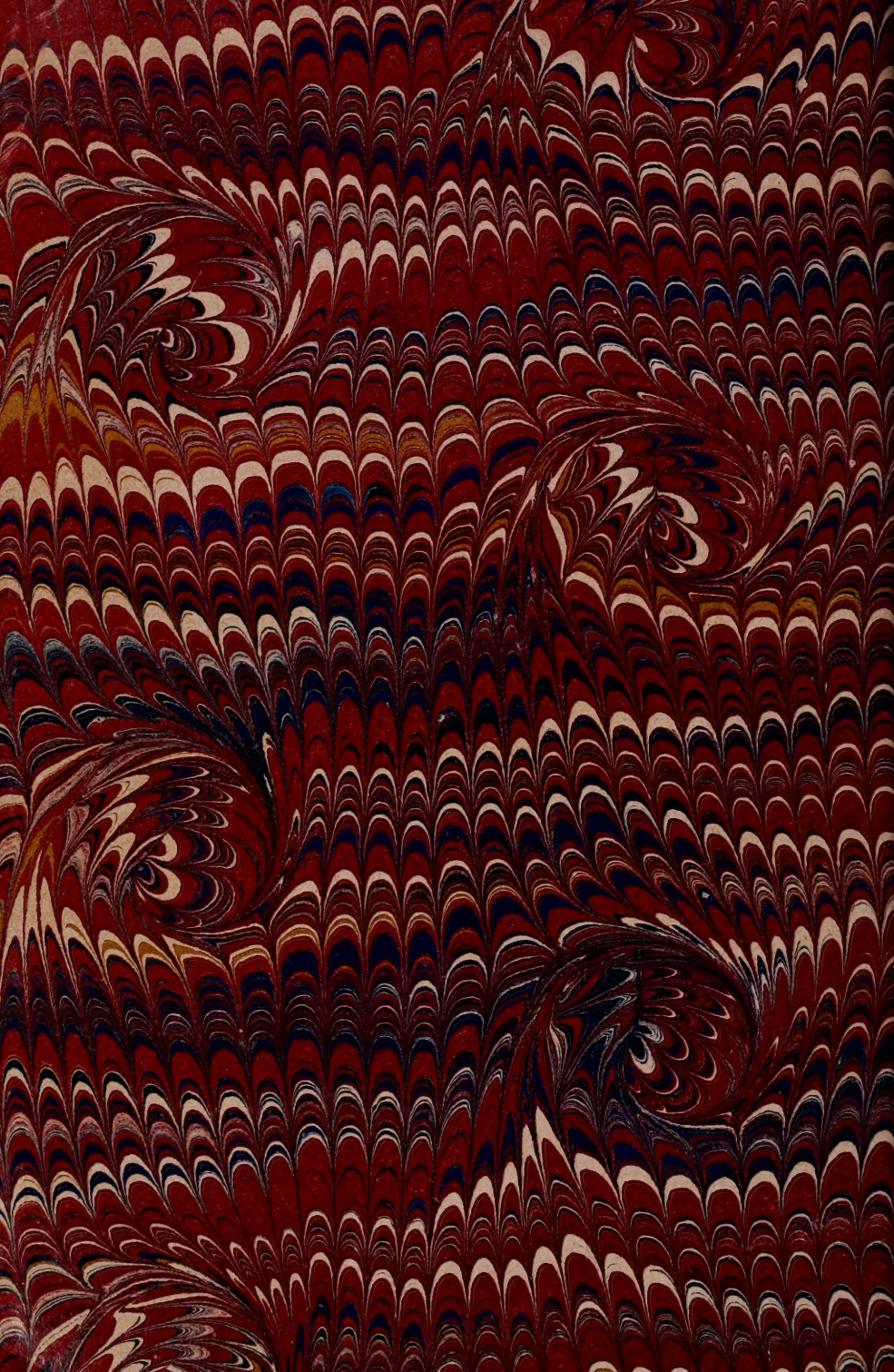

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